THE IRON TRADE REVIEW

VOLUME XXXV. CLEVELAND, O., MAY 8, 1902. NUMBER 19

THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

The booking of a large tonnage of structural shapes and plates for delivery next year is the new feature of the iron market in the week. For several months most structural mills have been sold up for 1902 and it is now evident that deliveries originally contracted to be made this year will be carried over to 1903. The business closed by Pittsburg mills the past week for next years is estimated at 50,000 tons. Week by week, with eight months of the years ahead, the character of the iron trade in 1903 is being determined. The situation in plate mills is not entirely clear. From being able two months ago to make fairly prompt deliveries, they are now reported in a number of instances to be sold up for the year. It would seem that the brunt of the steel shortage is to fall on the plate trade, and that after the large producers have filled their engagements in shapes and open-hearth bars they will not have steel sufficient to run their plate mills full. A meeting of plate manufacturers will be held in New York next week, but it is believed the 1.60c basis will be reaffirmed, in spite of the sales at $2 to $4 a ton higher from Eastern mills. The sales of both shapes and plates for 1903 have been on the basis of present pool prices. Sheets are the one line of finished material in which the mills are not sold for months ahead. In spite of the difficulties of independent sheet mills in getting material they are by no means a negligible factor in the market, particularly on galvanized sheets. The bar trade is quiet and it will probably be months before any heavy buying is done. The differential of $4 a ton over steel bars is calculated to restrict the sale of bar iron and in time to affect the prices of gray forge iron and mill scrap, which are both relatively high. The steel scarcity promises to continue for months. Imports, while increasing, are only a small factor and to a considerable extent enter into drawback export material. Some sales of German steel are reported in the Chicago district below the prevailing Pittsburg basis. It is understood that under a through rate from Antwerp to Chicago via New Orleans, of $3.75, billets have been sold at $31.50 Chicago. There is no change in the foundry iron market except that buyers seeking prompt iron are having less and less success. Buyng for delivery late in the year keeps up and the price of such iron is practically that recently prevailing in spot sales. The Southern situation has not cleared up, but the agreement between leading producers is reported to be no longer in force, and sales may be made in the near future by furnaces that have kept out of the market for some weeks, particularly from the Central Western market. It is not expected, however, that any $12 iron will be offered. In Bessemer iron little busness is doing because little iron is to be had, except what furnaces may be able to make in excess of engagements later in the year. For this $20 at the furnace is asked. Steel companies are all short of metal, and the question as to imports is simply whether there can be a reasonable profit on finished material sold, if English hematite is bought at present prices, with freight and $4 duty added.

PITTSBURG.

OFFICE OF *The Iron Trade Review*,
429 PARK BUILDING, May 7.

During the week a number of the large steel producers opened their books for the receipt of business on structural shapes and plates for delivery next year at present pool quotations. Contracts for fully 50,000 tons of material were placed by large structural fitting shops, bridge builders and contractors, and the indications are that a heavy tonnage will be closed from now on. It is already apparent to many of the large structural steel manufacturers that much of the steel promised for delivery this year will run over into next year, and the conditions that have prevailed in the structural market for the past six months promise to continue through at least the first half of next year. That the large steel fabricators have faith in the situation is indicated by their willingness to pay the present quotations for next year's deliveries, and this no doubt will have much to do with maintaining the present level of prices on nearly all commodities fixed by agreements through the first six months of 1903. Plates are an important factor to structural works and present prices have also been maintained for next year's delivery.

Many of the large buildings projected for erection this year and for which the contracts were to have been placed shortly will not be provided with steel until January, 1903, and it was for the purpose of permitting the contractors figuring on this work to place orders for their material when contracts were let, that books have been opened for next year's deliveries.

As yet there have been no sales of structural material from abroad in this district, although German shapes have been offered here at $44.25. Good deliveries have also been promised, and inasmuch as these prices are below those asked by dealers in domestic shapes there is little doubt that a considerable tonnage will be placed shortly. Sales of German sheet bars and billets continue at prices below those of the domestic mills.

The Bessemer iron market continues to grow stronger daily, and the furnacemen that have good sized lots for delivery through the third and fourth quarters are holding their product at $20.50 at the furnace. There have been numerous sales of small lots during the week for both prompt shipment and extended deliveries at prices ranging from $20 to $20.50 at the furnace. Should the market advance slightly less than $2 per ton it will be on a par with the quotations on English hematite laid down in Pittsburg. There have been large offerings for delivery within the next two months at $22.75, Pittsburg, and inasmuch as the shortage of Bessemer is growing larger daily there are likely to be considerable importations before the end of the year. None of the large steel producers who have scoured the market for Bessemer iron have been able to cover their shortages, and with the finishing mills operating at their utmost capacity until the end of the year there is little doubt that the present demand for Bessemer iron for steel making purposes will continue.

The strike of the structural iron workers continues, but there is every indication that their demands will be conceded owing to the immense amount of work tied up and the inability of the contractors to secure men to take the places of the strikers. All of the work on new iron and steel plants in this territory is temporarily stopped, and nearly all these contracts have time limits.

PIG IRON.—Coke deliveries at the furnaces in this district and in the Mahoning and Shenango Valleys were very bad last week, and while none of the furnaces were compelled to bank their outputs were cut down to a very large extent. This

week the coke shipments are somewhat better, but the indications are that there will be periods throughout the summer when the furnaces will be compelled to operate on extremely short stocks. Demand for Bessemer iron continues strong with many of the large steel producers still in the market for from 20,000 to 50,000 tons. It is not probable that the manufacturers will be enabled to supply their wants. Furthermore they are decidedly averse to paying the exorbitant prices asked for iron by some of the furnace operators. We note sales of Bessemer iron during the week amounting to about 7,000 tons divided up into small lots almost entirely. For prompt shipment as high as $20.50 at the furnace was paid, while for delivery through the third and fourth quarters the price was $19.50 to $20 at the furnace. We note the sale of 1,500 tons of No. 2 foundry iron for delivery through the second half of the year at $21 and 1,000 tons of forge iron at $19.50, Pittsburg. We also note the sale of 1,000 tons of mottled forge at $18.75, Pittsburg. The blast furnace workers still insist that they will strike unless they receive the shorter day on June 1, but there are already indications of a compromise. The furnace operators have again decided that they will not accede to the demands of the men and their firm stand is the result of investigation into the strength of the organization. We revise quotations as follows:

Bessemer, Valley	$19 50 to 20 50
Bessemer, Pittsburg	20 75 to 21 25
No. 1 Foundry	21 00 to 22 00
No. 2 Foundry	20 75 to 21 50
No. 3 Foundry	19 50 to 20 00
Gray Forge, Pittsburg	19 50 to 19 75
Chilled Basic, Valley	18 75 to 19 00
Chilled Basic, Pittsburg	19 50 to 19 75

STEEL.—We note a sale of 1,500 tons of German sheet bars for delivery through the second half of the year at $33, Pittsburg; also a sale of 500 tons of German billets for the same delivery at $32.25. Domestic steel is practically out of the market and is nominally at $33 for 4x4 Bessemer billets. Bessemer rods for delivery the second half of the year are quoted at $37, maker's mill.

SPELTER.—There has been little change in the spelter market, and we quote prime Western grades at 4.25c to 4.27c, Pittsburg.

FERRO-MANGANESE.—Considerable foreign ferro is being offered in this market at $48 to $49, and owing to the limited output of the furnaces in this country the indications are that an enormous tonnage will be sold this year. Domestic ferro, 80 per cent, is held at $52.50, delivered at buyer's mill.

MUCK BAR.—The muck bar market is very firm and small lots have been sold as high as $35.50 for prompt shipment. For forward delivery $33.50 to $34 is asked.

SKELP.—The skelp market continues firm with practically no steel skelp being offered. Iron skelp for prompt delivery is held at 2.20c to 2.25c, while for forward shipment 2.10c to 2.15c is quoted.

RAILS AND TRACK MATERIAL.—Demand for heavy section rails continues heavy, but inasmuch as only small lots can be furnished by the mills the railroads desiring round lots are being forced to buy relayers. It is doubtful if foreign rails will be brought into this country for the reason that they cannot be imported for less than $36.75, Pittsburg. We make the following quotations: Standard sections, 50 pounds and over, in lots of 200 tons and over, $28; car lots and less than 200 tons, $30; less than car lots, $32; light rails, 8 pounds, $45; 12 pounds, $42; 16 pounds, $39; 20 pounds, $37; 25 to 40 pounds, $33 to $35. Track material: Spikes, 2c to 2.05c; track bolts, square heads, 2.50c; hexagon heads, 2.65c; fish plates, 1.60c.

PLATES.—The advanced prices asked for plates by the Eastern plate mills have resulted in bringing much business to the Western mills and the market is growing stronger every day. During the week there have been large orders of sheared plates placed with some of the local mills by structural fabricators for delivery next year at ruling quotations. A meeting of the plate manufacturers will be held in New York next week, but no change in prices is anticipated. We make the following quotations. Tank plates, ¼-inch thick and up to 100 inches in width, 1.60c at mill, Pittsburg; flange and boiler steel, 1.70c; marine, ordinary firebox, A. B. M. A. specifications, 1.80c; still bottom steel, 1.80c; locomotive firebox, not less than 2.10c, and it ranges in price to 3c. Plates more than 100 inches wide, 5c extra 100 pounds. Plates 3-16 of an inch in thickness, $2 extra; gauges Nos. 7 and 8, $3 extra. These quotations are based on carload lots, with 5 cents extra a hundred pounds for less than carload lots. Terms, net cash, in 30 days.

BARS.—The Eastern bar iron manufacturers are contemplating another advance of $2 owing to the large amount of business on their books. New business in steel bars continues satisfactory, but is limited to small lots almost entirely. Our quotations are unchanged as follows: Bessemer steel bars, 1.60c; open-hearth, 1.70c; plow beams and cultivator beams, 1.60c, net; channels, angles, zees and tees, Bessemer under three inches, 1.70c; over three inches, 1.80c; bar iron, 1.70c to 1.80c, Pittsburg, with full freight added to point of delivery. Hoops and bands are quoted at 1.90c, full extras, in 250-ton lots and over, and 2c in less than 250-ton lots; refined iron bars, 2c and upwards.

PIPES AND TUBES.—The merchant pipe market continues very strong, while the demand for boiler tubing and casing is larger than ever before. We make the following discounts to jobbers in carload lots, Pittsburg:

MERCHANT PIPE.

	Black. Per cent.	Galv. Per cent
⅛ to ¼ and 11 to 12 inches	60	48
⅜ to 12 inches	67	53

Discounts below are to consumers, carload lots, Pittsburg:

BOILER TUBES.

Steel.

	Per cent.
1 to 1½ inches	45
2¼ to 5 inches	63½
1¾ to 2¼ and 6 to 13 inches	58

Iron.

	Per cent.
1 to 1½ and 2¼ inches	39
1¾ to 2¼ inches	38
2¾ to 13 inches	48

CASING.

	S. and S. Per cent.
2 to 3 inches	58
3¼ to 4 inches	63
4½ to 12½ inches	65

SHEETS.—The market for all gauges continues firm and prices are being well maintained. Competition is still more noticeable in galvanized than in black sheets. We make the following quotations: Nos. 10 and 12, 2.40c to 2.50c; 14 and 15, 2.50c to 2.60c; 16, 2.60c; 18 and 20, 2.70c to 2.80c; 22 and 24, 2.80c to 2.90c; 26, 2.90c to 3c; 27, 3c to 3.10c; 28, 3.10c to 3.20c; 29, 3.25c to 3.35c; 30, 3.35c to 3.45c. Galvanized sheets, in carload lots to consumers, are quoted at 3.05c for Nos. 10 and 11, 3.45c for Nos. 18 to 21, 4.20c for No. 27, and 4.50c for No. 28. Galvanized sheets, mill shipments in carload lots, are as follows: No. 14, 3.06c; No. 16, 3.18c; No. 20, 3.38c; Nos. 22 and 24, 3.69c; No. 26, 3.95c; No. 27, 4.20c; No. 28, 4.47c. Quotations on mill shipments in less than carload lots are as follows: No. 14, 3.25c; No. 16, 3.35c; No. 20, 3.56c; Nos. 22 and 24, 3.88c; No. 26, 4.15c; No. 27, 4.40c; No. 28, 4.67c. For shipment from warehouse jobbers ask 5 cents per hundred above the latter quotations which may be considered the quotations to the average consumer.

STRUCTURAL MATERIAL.—Contracts calling for nearly 50,000 tons of structural material were placed with several of the mills during the week for delivery next year at existing agreed quotations, which are as follows: Beams and channels, 3 to 15 inches, 1.60c; 18 to 24 inches, 1.70c; tees, 1.65c; zees, 1.60c; angles from 3 to 6 inches, 1.60c; universal mill plates, 1.60c.

WIRE AND WIRE NAILS.—At the meeting of the cut nail manufacturers held last week no change in the price of nails was made. Demand for all kinds of wire products is reported strong. We make the following quotations: Wire nails in carload lots, $2.05 per keg; smaller lots, $2.10 and $2.15; plain wire, $2 in carload lots and $2.10 in less than carload lots to retailers; galvanized wire, $2.40 in carload lots; polished staples, $2.20, and galvanized staples, $2.60; painted barb wire, $2.60, and galvanized, $2.90. These prices are quoted on a Pittsburg base, plus the actual freight to destination. Cut nails are held at $2.05 in carload lots and $2.10 in less than carload lots, Pittsburg, plus freight to destination.

MERCHANT STEEL.—The merchant steel market continues to share the activity of all other lines, and the business that is being done is very satisfactory. We make the following quotations: Turned, cold rolled and ground shafting in carload

lots is quoted 50 off, and in less than carload lots, 45 off; tire steel, 1.80c in carload lots and 2c less than carload lots; toe calk, 2.10c to 2.25c; sleigh shoe, 2.10c to 2.25c; machinery steel, 1.70c; smooth machinery steel, 1.75c. Tool steel, 7 cents and upwards.

OLD MATERIAL.—There have been additional large sales of old rails during the week by both the B. & O. and the Erie railroads amounting to nearly 18,000 tons. All the roads having old rails on their hands are unloading them to take advantage of the present high prices. We revise quotations gross tons, as follows: Heavy wrought scrap, $19.25 to $19.50; cast scrap, $17.50 to $17.75; iron rails, $24 to $25; car wheels, $19; cast borings, $11.50 to $12; wrought turnings, $13.50 to $14; steel rails, short lengths, $21 to $21.50; steel rails for rerolling purposes, $24 to $24.50.

COKE.—For the week ending Saturday, April 26, the total estimated production of the Connellsville region amounted to 220,799 tons, a slight falling off over the production of the previous week. Strictly Connellsville furnace coke for prompt shipment is held at $2.50 and foundry at $3. Outside coke is about 25 cents below these quotations.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
934 MONADNOCK BLOCK, May 6.

Nothing of interest has transpired in the past week in the local market. The inquiry for future delivery has fallen off to a great extent, as most all the buyers are now fully aware of the condition of mills and furnaces, and manufacturers as a rule are not booking orders for next year's delivery. The demand for prompt shipment of iron and steel, however, is as insistent as ever. Inquirers for finished product are invariably referred to local jobbers who have large stocks on hand, and these report a phenomenal activity. Mills can furnish fairly good deliveries on sheets and bars, but not on other products. Light rails cannot be had from mill within three months; spikes not before the first of next year; bolt manufacturers are sold up for four months; billets can only be secured as a favor; wire products not within three months; structural mills cannot deliver on new orders before next year, and the demand on jobbers for this material is so great that high premiums are being paid from store. The scarcity of spot pig iron grows more pronounced each week, and only occasionally is a carload offered which is eagerly bought, whatever its price. The Inland Steel Co., of this city, announces that its new open-hearth plant at Indiana Harbor, Ind., will be in operation early in June. The company will manufacture open-hearth billets, slabs, sheet and tin plate bars, shafting, plain and galvanized sheets, and the lighter sections of structural angles, channels and I-beams. The works will have a capacity of 500 tons a day.

PIG IRON.—Sales of iron in the week just closed have not been many, nor was the aggregate tonnage large. All the Southern furnaces are still out of the market, and with the exception of one concern, which occasionally has a little spot iron to offer, all report that they are refusing to bid on any business that is offered. None know when they will be in the market again, nor can they say on what basis Southern iron will be sold when they are in position to take orders. Southern No. 1 foundry for immediate shipment has been sold at $20.65 in the past week; Southern No. 2 at $20.15, and Northern No. 2 foundry at $21.50. A few contracts for Northern iron for delivery in the last quarter have been closed, but these were all for small lots. The local implement concern, which was recently in the market for 5,000 tons, has placed its order. We quote as follows:

Lake Sup. Charcoal	$22 50 to $23 00	Southern Coke No. 4	$1 15 to $ 8 15
Local Coke Fdy. No. 1	21 00 to 21 50	Southern No. 1 Soft	18 65 to 19 65
Local Coke Fdy. No. 2	20 00 to 20 50	Southern No. 2 Soft	18 15 to 1 5
Local Coke Fdy. No. 3	19 00 to 20 00	Southern Gray Forge	16 90 to 17 90
Local Scotch Fdy. No. 1	21 00 to 21 50	Southern Silveries	18 25 to 19 65
Local Scotch Fdy. No. 2	20 50 to 21 00	Jackson Co. Silveries	23 10 to 23 60
Southern Coke No. 1	18 65 to 19 65	Ohio Strong Softeners	23 10 to 23 60
Southern Coke No. 2	18 15 to 19 15	Alabama Car Wheel	23 65 to 24 15
Southern Coke No. 3	17 65 to 18 65	Malleable Bessemer	20 30 to 20 50

BARS.—Notwithstanding the heavy bookings that were made by mills last month, most all the local manufacturers report they are in position to give fairly prompt delivery on new business. A very good general business is reported, orders being for 500 tons down to carload lots. One mill reports that it has just received an order for 1,000 tons of bar iron, for delivery from July to July. Quotations are held firmly at 1.75c to 1.85c for steel, Chicago; 1.90c to 1.95c for iron, Chicago; hoops, 2.15c, Chicago. Prices out of store, steel, 2c to 2.10c; iron, 2.25c; hoops, 2.30c to 2.40c.

SHEETS.—Mills report that on heavy sheets they are only able to give deferred delivery, but on the lighter gauges reasonably prompt shipment can be made. There is a good demand for all sizes, both black and galvanized. We quote No. 27 black, mill shipments, Chicago delivery, 3.15c to 3.25c; galvanized, 4.40c to 4.50c; out of store, No. 27 black, 3.45c to 3.55c; galvanized, 4.70c to 4.80c.

STRUCTURAL STEEL.—There is nothing to report except that jobbers continue to do a remarkably big business, high premiums being asked for shipments from store. Eastern mills with stocks in Chicago are still offering the same on the basis of 2.50c. No change has been made in mill prices, which are as follows: Beams, 15 inches and under, 1.75c; 18 inches and over, 1.85c; structural angles, 3x3 to 6x6, 1.75c; over 6x6, 1.85c; angles, channels and tees smaller than three inches, 1.85c base; plates, 1.85c. Prices on lots from store are based on the necessities of the buyers, and vary in the different offices.

BILLETS.—Local mills report that occasionally sales of small lots are made to favored parties. We quote Bessemer billets, $38; open-hearth, $40.

RAILS AND TRACK SUPPLIES.—Further inquiries for standard sections are reported, and some sales for small lots for delivery the last of the year have been closed. The local mill, however, is sold up until the end of the year on heavy sections, and on light rails for three months. It is also out of the market for the entire year on spikes, and for four months on bolts and nuts. We quote standard sections, $28; light rails, 45 pounds, $33; 12 pounds, $40, with regular differentials for intermediate sizes; out of store, $45 to $50; splice bars, 2c; spikes, carload lots, 2.35c; track bolts and hexagon nuts, 3.10c to 3.25c; out of store, 3.50c; square nuts, 2.95c base; out of store, 3.10c.

MERCHANT STEEL.—Further contracts for tire steel have been closed with the carriage manufacturing trade in the past week, and a number of good sized orders have also been received from implement manufacturers. Prices are held firmly. We quote mill shipments, Chicago delivery, as follows: Smooth finished tire steel, 1.95c to 2c; open-hearth spring steel, 2.45c to 2.60c; sleigh shoe, 1.75c to 1.80c; flat sizes, concave and convex, 2c; out of store, 2.15c; cutter shoe, 2.40c to 2.60c; machinery steel, 2.15c to 2.25c, base; plow steel, 2.50c and upwards, according to quality; toe calk, 2.25c to 2.35c; out of stock, 3c to 3.10c; ordinary tool steel, 6c to 7c; specials, 13c and upwards; less than carload lots, 5 per cent to 10 per cent higher; cold rolled shafting, carload lots, 50 per cent off, Chicago; less than carload lots, 45 per cent off, Chicago.

MERCHANT PIPE.—Current demand for both merchant pipe and boiler tubes is of fair proportions. The market is devoid of any exceptional features, and most of the orders are for small lots. Jobbers have advanced price of steel tubes 2½ per cent. We quote as follows:

MERCHANT PIPE, RANDOM LENGTHS.

	Black Per cent.	Galv. Per cent.
⅛ to ⅜ in.	56½	44½
¼ to 12 in.	63½	51½

BOILER TUBES.

Steel.

	Per cent.
1 to 1½ in.	35
1¼ to 2½ in.	50
2¾ to 5 in.	57½
6 to 13 in.	52½

Iron.

	Per cent
1½ in.	35
1¾ to 2¼ in.	34½
2½ in.	35
2¾ to 5 in.	42½

CAST IRON PIPE.—A good demand is reported for all sizes of pipe, and many inquiries are reported from municipal governments. We quote as follows: 4-inch water pipe, $31, carload lots, f. o. b. Chicago; 6-inch water pipe and larger sizes, $29 to $30; gas pipe, $1 a ton higher than these prices.

PLATES.—The local mill is not accepting new business, its capacity for several months being entirely sold. Jobbers report that the demand is active and that orders are being received from points in Canada, the Pacific slope and from East-

ern points. The aggregate tonnage sold through jobbers is large. We quote as follows, Chicago delivery: Tank steel, base, ¼-inch, 1.85c to 1.95c; flange steel, 1.95c to 2.05c; marine steel, 2.05c to 2.15c; firebox steel, ordinary, 2c to 2.10c; special, 2.25c and upward.

Wire and Wire Nails.—Business is coming in to manufacturers quite freely, the entire output of mills going immediately into consumption. The local interest is about three months behind in the shipment of its orders, due in a measure to lack of cars. This is gradually being remedied, however, by the opening up of lake traffic, a large tonnage now being shipped to lake points by boat. We quote as follows: Smooth wire, carload lots, $2.15; painted barb wire, $2.75; galvanized barb wire in carload lots, $3.05; wire nails, carload lots, $2.20; staples, carload lots, $2.30; jobbers' prices to retailers, 10 cents higher than above for carload lots, and 20 cents higher for less than carloads.

Coke.—It is comparatively easy to get Virginia and West Virginia coke in any quantity, and shipments from the Connellsville regions are improving. Standard 72-hour Connellsville foundry coke is offered at $5.25; for spot shipment, $5.50; Virginia and West Virginia coke, $5 to $5.25.

Old Material.—Though no change in prices has been made, except on old steel rails, heavy melting steel and old wheels, the market is weaker all along the line. All the heavy consumers are well stocked up with material. A considerable amount of scrap has been shipped into this city, with the result that much is offered though not much is taken. We quote gross tons, as follows:

Old iron rails	$24 00 to $25 00	Old steel rails, mixed	$16 00 to $16 50
Old steel rails, 5 ft. and up	22 00 to 23 00	Relaying rails	27 00 to 28 00
Old steel rails, 3 ft. and under	17 00 to 18 00	Old wheels	19 00 to 19 50
		Heavy melting steel	15 50 to 16 00
		Mixed country steel	13 50 to 14 00

The following are selling prices per net ton:

No. 1 R. R. wrought	$19 50 to $20 00	Steel axles	$19 00 to $19 50
No. 2 R. R. wrought	18 00 to 18 50	Cast borings	8 50 to 9 00
Dealers' forge	15 50 to 16 00	Wrought turnings	12 50 to 13 00
No. 1 busheling	13 50 to 14 00	Iron axle turnings	14 00 to 14 50
No 1 R.R. & mch.cast	13 50 to 14 00	Steel axle turnings	13 00 to 13 50
Railway Malleable	15 00 to 15 50	Stove plates	10 50 to 11 00
Country malleable	13 00 to 14 00	Old iron splice bars	21 00 to 21 50
Lo axles	24 50 to 25 00		

CLEVELAND.

OFFICE OF *The Iron Trade Review*,
1084 Rose Building, May 7.

Iron Ore.—The figures representing iron ore shipments to May 1 are surprisingly large. There has never been such an April record since ore began to come to Lake Erie ports. From all the docks on Lake Superior and Lake Michigan the shipments to May 1 were 1,854,902 gross tons. This does not include the ore sent from Michipicoten Bay to Lake Erie ports—about 70,000 tons, beside which there are the Michipicoten shipments to Midland and Hamilton, Ont. The May 1 total given above is 265,000 tons more than the total to June 1 last year, when there were no April shipments. At the rate of April, during which month a number of mines made no shipments, there is little doubt that nearly 4,000,000 tons could be shipped in May, bringing the total to June 1 in the neighborhood of 5,700,000 or 5,800,000 tons, an unparalleled record. Estimates continue to be made of the amount of ore that will come down this season. If the next six months show an average of 3,500,000 tons, which was the average of June, July and August last year, there would be a total of 22,854,000 tons by Nov. 1. There is vessel capacity to do this, and the docks will be equal to it if they give no better dispatch than last year's, which was generally poor. With about 3,000,000 tons of ore on the docks April 1 this year, a date corresponding to May 1 of last year, when over 3,000,000 tons was carried, it has been estimated by some authorities that no great increase would be made this season over the shipments of 1901. However, it is now known that the United States Steel Corporation mines will make larger shipments than were estimated earlier in the season, and this year's total performance may exceed 22,000,000 tons. From the present outlook this can be reached, if there is a demand for the ore.

Pig Iron.—The scarcity of Bessemer iron is still marked, and steel companies are still picking up any metal available. For delivery in the last quarter $19.50 to $20 is asked. Spot Bessemer has sold in small lots at $20.50 at furnace. Foundrymen are still finding difficulty in some cases in getting iron for immediate needs. For the first time in their experience some of them are finding it impossible to get iron at any price. Sellers expect conditions to improve as the year advances, but iron for the secnd half, and particularly for the third quarter, the supply that can be sold with any confidence of making deliveries, is limited. There is now little difference in prices for any delivery this year, though for the first quarter of 1903 sales are from 50 cents to $1 a ton below the level of early delivery iron. Gray forge is higher and very hard to get at any price. We quote $18.50 to $19 at Valley furnace. No. 2 foundry brings $20 to $20.50 at the furnace, the minimum being $19.50. Cleveland prices are as follows:

Bessemer	$20 25 to $21 25	Scotch No. 1	$20 75 to $21 75
No. 1 Strong F'dry	20 75 to 21 75	Scotch No. 2	19 75 to 20 75
No. 2 Strong F'dry	19 75 to 20 75	Gray forge, Valley	18 50 to 18 75
No. 3 Foundry	18 75 to 19 75	LakeSuperior charc'l	22 00 to 23 00

Finished Material.—There is comparative quietness in sales departments, but a continuance of the greatest activity in shipping departments. Specifications are of heavy volume in nearly all lines. Sheets are perhaps the least active department of the market; at all events there is not the buoyancy apparent elsewhere, and certainly not the difficulty in getting material. Naturally the sheet market shows a marked increase in demand in spring months; thus far there has not been the expansion looked for, as compared with the winter movement. In galvanized there is more evidence of competition than in black sheets and prices on galvanized are more apt to be shaded. We continue to quote the following prices on mill sales of black sheets: No. 24, 2.90c to 3c; No. 26, 3c to 3.10c; No. 27, 3.10c to 3.20c; and the following prices out of stock: No. 10, 2.35c to 2.50c; No. 12, 2.45c to 2.60c; No. 14, 2.55c to 2.70c; No. 16, 2.95c to 3.10c; No. 18, 3c to 3.15c; No. 20, 3.05c to 3.20c; Nos. 22-24, 3.15c to 3.30c; Nos. 22-26, 3.25c to 3.40c; No. 27, 3.35c to 3.50c; No. 28, 3.45c to 3.60c, for one pass cold rolled. For full cold rolled .10c extra is charged. On galvanized sheets Cleveland prices to consumers are as follows for carload lots: Nos. 10 and 11, 3.15c; Nos. 12 to 14, 3.25c; Nos. 18 to 21, 3.55c; Nos. 22 to 24, 3.85c; No. 27, 4.35c; No. 28, 4.60c. The condition of the plate mills shows a marked contrast to that of a few weeks ago. Now, there is no disposition to take on new business, though it is not probable that the year's output has been sold up, where mills were almost anxious for orders but two months ago. We continue to quote 1.70c Cleveland for tank plates. Structural business is being taken for next year on the current basis, and considerable building planned for 1902 is likely to go over to next year. The trade in bars is quiet. At present prices for forge iron and scrap the mills rolling iron are not anxious for business, and the differential of $4 a ton between bar iron and Bessemer steel bars is turning business to the latter, which appears to be in accordance with the intention of the manufacturers. We quote mill shipments of bar iron at 1.88½c Cleveland, and bar iron out of store at 1.90c to 2c; steel bars, 1.68½c Cleveland for mill shipments.

Old Material.—Current quotations in the scrap market remain the same though business is quiet and there is little movement of material. Dealers are asking the following prices, for Cleveland delivery, all in gross tons:

Old iron rails	$ 24 00 to 26 00
Old steel rails (6 ft. and over)	21 00 to 23 00
Old steel rails (6 ft. and under)	17 00 to 19 00
Old car wheels	18 00 to 19 00
No. 1 R. R. wrought scrap	21 00 to 22 00
Mill scrap	17 00 to 18 50
No. 1 machine cast scrap	15 00 to 16 00
Iron axles	26 00 to 28 00
Axle turnings	16 00 to 17 00
Wrought turnings (free from cast)	13 50 to 14 00
Cast borings	9 00 to 10 00
Uncut wrought iron boilers	11 00 to 12 00
Steel boiler plates	16 00 to 17 00
Grate bars	11 00 to 12 00
Pipes and flues (clean)	17 00 to 18 00
Tank iron	17 00 to 18 00
Hoop and band iron	13 00 to 14 00
Sheet iron	11 00 to 12 00
Wrought drillings	13 00 to 13 50
Malleable iron	17 00 to 18 00
Stove plate	12 50 to 13 50
Heavy steel	17 00 to 18 00

CINCINNATI.

May 7.

While there has been nothing during the past week to distinguish the iron trade in this district from the same situation of a week ago, it is likely that before another week the condi-

tion will be altered. It is expected that several large producers will resume selling after being out of the Central Western market for more than two months. If this expectation is realized there will be a great deal more activity in this district, especially in Southern iron. Other branches of the iron trade continue in the same satisfactory condition. The demand is good, the only trouble being in getting satisfactory deliveries. The advent of warm weather has stimulated building. Manufacturers and jobbers who have had in contemplation the erection of new plants and warehouses are now seeking to let contracts or are asking for the delivery of material already contracted for. Manufacturers of articles in which iron largely enters are having a continued good business, farm implement makers, vehicle manufacturers, and machine tool men being conspicuous.

PIG IRON.—It is believed that in the next few days some of the large Southern iron producers that have been out of the market by agreement will be offering iron again. The price will not be $12 for No. 2 Birmingham, but $15. While this is not stated upon the authority of any official or agent it comes directly enough to make it reliable. A meeting which it is understood was held to discuss the situation and keep the various producers in line did not result in any renewal of the agreement that expired April 30.

During the past week the pig iron business has not been heavy; nevertheless agents who have had iron to offer have been rather surprised at the orders they received. They explain the fact that they can sell iron at $15 and $16 Birmingham in spite of the supposition that everybody was well covered, by the statements of some of the large consumers that they have been unable to secure prompt delivery. They are therefore compelled to buy pig iron elsewhere or close down. The alternative that most of them take is to buy iron from whatever source they can get it and pay the price. There has been some complaint about these deliveries, and it is stated that some producers are more than a month behind in furnishing iron on contracts. Such business as has been done has been largely spot or early delivery.

According to the views of some of the best posted handlers of pig iron the Southern producers will not all be very busy again until the latter part of August or the first of September. This refers more particularly to the Tennessee Coal, Iron & Railroad Co., it being pretty generally understood that some of the other large producers will be in the market again very soon. Quotations at Cincinnati are given as follows:

Southern Fdy. No. 1	$18 25 to 18 75	Gray Forge	$16 75 to 17 25
" " 2	17 75 to 18 25	Northern Fdy. No. 1	22 00 to 22 50
" " 3	17 25 to 17 75	" " 2	21 00 to 21 50
" " 4	16 75 to 17 25	Southern C. W. iron	22 00 to 22 75
So. Fdy. No. 1 soft	18 25 to 18 75	Malleable coke iron	21 00 to 21 50
So. Fdy. No. 2 soft	17 75 to 18 25		

FINISHED MATERIAL.—The market here is strong and in the best possible condition from the standpoint of the mills. There is a good demand and a disregard of prices on the part of the consumers that indicates that they are very desirous of getting the material. While no advances are reported it is generally believed that they may take place at any time. Iron and steel bars are particularly firm. Prices remain unchanged at 1.92c for iron bars and 1.72c for steel bars. Angles are 2.20c and plates 1.85c. Sheets, No. 28, are 3.35c to 3.40c, and No. 12, blue annealed, 2.50c.

OLD MATERIAL.—There is not much change in the scrap market, there being a fair demand for all material offered and some advances being noted in various kinds, though consumers are loth to pay present prices. Following are quotations at Cincinnati:

Old No 1. Wrought Railroad, net tons	$ 19 50 to 20 00
Cast Machine and Foundry, net tons	14 00 to 14 50
Old Iron Rails, gross tons	25 00 to 26 00
Old Steel Rails, gross tons	24 50 to 24 75
Old Short Lengths, gross tons	17 50 to 18 00
Old Iron Axles, gross tons	24 00 to 24 50
Old Iron Car Wheels, gross tons	19 00 to 19 50
Stove Plates, gross tons	11 00 to 11 25
Wrought Turnings, net tons	13 00 to 14 00
Cast Borings, net tons	8 00 to 8 50

PHILADELPHIA.

May 6.

There is a strong feeling throughout the market, and although the volume of actual business transacted from day to day is not large, prices appear if anything to be ascending. Material continues scarce and hard to get hold of. On the buyer's side there is a tendency to hold off orders for long time deliveries at least until the material contracted for abroad shall materialize and demonstrate the extent to which imports will afford relief. It is generally considered that some of the reported foreign purchases are of a speculative character and that an easier market at home will result in immediate reselling as long as this can be accomplished without loss. Labor troubles and their possible extension are the only disturbing element in sight; but the majority of these are believed to be capable of settlement without recourse to extreme measures.

PIG IRON.—If the furnaces can be kept working to their fullest capacity during the summer months it is confidently expected that iron enough will be produced to take care of all. For the present not much effort is being made to place orders, but as sellers have disposed of practically all the iron they are able to furnish for many weeks to come this causes no uneasiness and is indeed considered a relief. For such small lots of iron as it is possible to find and on which prompt delivery can be guaranteed, the prices for Philadelphia and nearby points average about 50c to 75c a ton above the following quotations, which are for July to December deliveries: No. 1 X foundry, $20.50 to $21.50; No. 2 X foundry, $19.75 to $20.50; No. 2 plain, $19.25 to $19.75; standard gray forge, $18.50 to $18.75; ordinary gray forge, $18 to $18.25; Basic (chilled), $19 to $19.50.

FINISHED MATERIAL.—The stringency in structural material is very marked, and whatever importations have so far come to hand have had but little effect upon the market. The bar mills are being kept fully employed and prompt deliveries of steel bars are difficult to obtain. But little business is being accepted by the plate mills except from regular customers who are taxing the capacity of the majority of plants. Nominal quotations are as follows, though it is well known that premiums are being willingly paid where shipments are warranted within a specified time. Plates, ¼-inch and thicker, 1.95c to 2c; bars, steel, 1.80c to 1.85c; iron, 1.95c; angles, 1.75c to 1.85c; beams and channels, 1.75c to 1.85c.

OLD MATERIAL.—A great deal of material is needed to supply current requirements, but there is no heavy buying. Although the market at times shows signs of irregularity there is no quotable change in prices. Bids and offers are about as follows for deliveries buyers' yards: Choice railroad scrap, $25.50 to $26; ordinary light scrap, $16 to $17; machinery cast, $18.25 to $18.75; heavy steel scrap, $21 to $22; old iron rails, $25 to $26; wrought turnings, $16.75 to $17.50; cast borings, $10 to $10.50; old iron axles, $26.50 to $28; old steel axles, $24 to $25; old car wheels, $18 to $19.

New Blast Furnace Construction.

Archer Brown, of Rogers, Brown & Co., says in his iron market review from New York:

"New furnace schemes, as we have before mentioned, continue to engage attention. The latest calculation covering furnaces actually begun, or arranged for beyond any question, makes a total of twenty-seven, with an annual capacity of fully 2,500,000 ton. If to this is added a 10 percent increase in output of existing plants, through the constant improvement that is the order of the day, it will be seen that all previous estimates of production are likely to be exceeded.

"It is unofficially reported that the United States Steel Corporation is also planning extensive building of furnaces West and East, to render them independent of the open market. This may well be doubted, in view of the obvious necessity that would be upon the owners of such properties, when deprived of their leading customer to build steel works of various kinds to use up their product, thus creating new and important competition in the field of finished forms, wherein the Steel Corporation of course makes its largest profits."

The Lloyd-Booth works of the United Engineering & Foundry Co., at Youngstown, O., are adding a 15-ton air furnace. Their present capacity is one 20-ton and one 15-ton furnace. A contract has also been let to the Shaw Electric Crane Co. for a 15-ton yard crane to handle pig iron, castings and heavy scrap, this work being now done by a stationary hoist. The new crane will have a span of 38 feet and the runway will be about 200 feet long.

THE IRON TRADE REVIEW

Devoted to the Machinery, Metal-Working and Foundry Trades, and Iron and Steel Manufacture.

PUBLISHED EVERY THURSDAY BY

THE IRON & STEEL PRESS CO.,

ROSE BUILDING, CLEVELAND, OHIO.

G. H. GARDNER, President and Treasurer.
JOHN A. PENTON, Vice-President.
A. I. FINDLEY, Secretary.

A. I. FINDLEY, - - - - - - - - - - EDITOR.
ROBERT I. CLEGG, - - EDITOR MACHINERY DEPARTMENT.

CHICAGO: 519 Monadnock Block, GEO. H. GRIFFITHS, Manager.
PITTSBURG: 429 Park Building, A. O. BACKERT, Manager.
NEW YORK: 150 Nassau St., D. C. WARREN, Manager.
THE CENTRAL WEST: R. A. EVANS, Manager.

Subscription, $3.00 per annum. To Foreign Countries, $4.00.
Advertising Rates Furnished on Application.

The Cleveland News Co. will supply the trade with THE IRON TRADE REVIEW through the regular channels of the American News Co.

ENTERED AT THE POST OFFICE AT CLEVELAND, O., AS SECOND CLASS MATTER

MAY 8, 1902.

Works management, organization and personnel are elements in the American supremacy in steel manufacture to which foreign investigators have given far too little weight. It has been too much the way to make ability to produce cheaply a function of cheap raw materials, improved equipment, advantages in freights and labor free from trade union hamperings. As is intimated by Mr. Bonnell in his observations on the Continental iron trade, given in another column, the European works system, with its complete subordination of everybody and everything to a single head bears no comparison with that which has made the more conspicuous steel companies in the United States so signally successful.

The typical American idea concerning shop equipment is well expressed by W. K. Barnum, master mechanc of the Union Pacific Railroad, in a recent paper: "Tools are not up-to-date when there is something else on the market that will do more work or do it at less cost of labor. They need not necessarily be worn out to be wasteful by comparison." That it has always done its work well and is still good for many years' service, is the staple British plea for the retention of equipment which it is proposed to replace. The live engineer, familiar with the advance made in a given line of tools, needs only to be told that a certain tool has been in service five years or ten years to know that the practice in the shop in question is not the best. The tool may be well preserved, and it may be giving its full efficiency, but better tools for the work have been produced in the interval, and every week the old machine is kept at work is at a loss of possible product.

It is interesting to note the growth of protection sentiment in Great Britain, and more interesting to read the argument advanced for the imposition of a tariff on imports which compete with British manufactured products. In the following, for example, from the London *Ironmonger*, there is a very familiar ring about the suggestion that the foreigner seeking British markets should pay his share of taxes in return for the privileges of trade. The facts have borne it out in American experience, but it is surprising that the truth should find such appreciation in Great Britain, where protection is only known in theory and free trade is the practice:

> The demand for the imposition of a customs revenue duty on foreign goods competing with British articles seems to be much more popular than most people suppose. Twenty-two petitions, signed by 197,175 persons in all, have been presented to the House of Commons in the last few weeks asking for such a tax—in other words, advocating a return to protection. The gist of the petitions is that if a customs revenue duty were imposed upon foreign goods entering the United Kingdom a great part of the tax would be paid by the foreigner, who at present contributes nothing to the revenue of this country for the benefit he derives from the use of its markets. It is also pointed out that a revenue duty upon imported goods (many of them luxuries) would furnish the exchequer with a very substantial revenue, and would at the same time give greatly needed assistance to our hard-pressed and decaying industries.

While this movement is gaining headway in Great Britain, though we believe with only remote chance of any practical outcome, there are those in the United States who actively advocate the battering down of our tariff guards in iron and steel. To such proposals General Manager Swank, of the American Iron and Steel Association, makes a strong answer in the letter printed elsewhere in this issue.

McKeesport Tube Mills to be Removed.

(Special Telegram.)

PITTSBURG, May 7.—It has been practically decided by the officials of the National Tube Co. to remove their entire McKeesport plant with the exception of the blast furnaces to Woodson, near Elizabeth, on the Monongahela River, where a site of more than 200 acres is owned by the United States Steel Corporation. The National Tube Co. has been negotiating for some time for the purchase of the strip of land separating the furnaces from the steel plant in McKeesport but owing to the high prices asked by the owners has given up all options. It has been decided therefore that the plant may as well be located at Woodson further up the Monongahela River, where there will be more room to spread out. The blast furnaces will remain at McKeesport. The site at Woodson was purchased by the W. DeWeese Wood Co. when it decided several years ago to erect blast furnaces and a steel plant. The project was given up when the plant was taken into the American Sheet Steel Co.

The E. A. Kinsey Co., of Cincinnati, have just issued a machinery catalogue containing 1065 pages. This is entirely separate from their supply catalogue which will be ready in about two months.

A contract has been awarded by the St. Clair Furnace Co. for the building of an extensive ore-handling plant for the furnaces at Clairton, Pa., to the Brown Hoisting Machinery Co., of Cleveland. It calls for an equipment for three 600-ton furnaces.

Emperor William has ordered Director Fritz of the German Government shipyard at Kiel to proceed to the United States to study the methods of American shipyards, particularly as regarding labor saving machinery.

The Shenango plant of the American Tin Plate Co., located at New Castle, Pa., was badly damaged by a tornado which passed over the city on Tuesday, May 6. All the stacks were blown down and the entire steam system was disarranged. The loss is estimated at $50,000.

AN AMERICAN VIEW OF THE FOREIGN IRON TRADE.

Wm. F. Bonnell, of Otis, Bonnell & Co., Cleveland, who went abroad in February to buy steel for the associated independent producers of sheets, landed in New York on Saturday. The statement was given out some weeks ago on behalf of those for whom Mr. Bonnell acted as commissioner that owing to the advance in prices abroad he had bought little or no steel. Naturally what was done or not done in this direction was not discussed in an interview a representative of *The Iron Trade Review* had with Mr. Bonnell this week, but in a general way conditions in the iron trade abroad were touched on.

"In Scotland, England, and Wales," said Mr. Bonnell, "conditions in the iron trade are fairly good, with a tendency to grow better. The prospect of a termination of the Boer war is having a good effect, and in the impulse that is sure to be given business, when peace is declared the iron trade will profit greatly. Hundreds of cars of iron and steel material are waiting the official word, to be shipped to the Transvaal—this including cutlery and other hardware, galvanized sheet houses shipped knocked down, sheets, wire fencing and a score of other products, in addition to large shipments of machinery. There is no question of the great improvement that the termination of the war will bring to the iron and machinery trades, following the gradual improvement of the past several months. Then it is not to be expected that the recent transfer of so large a vessel tonnage from English to American hands means that the former owners are out of the shipping business. The interests represented in the White Star Line, for example, for four and five generations, may be depended upon to become owners of new tonnage that can be built for a fraction of what they sold for. On the whole the outlook in Great Britain for the iron and steel trade is good.

"Belgian mills are in quite good shape. Among the business going through the rail mills there is about 200,000 tons for Mexico which mills in the United States could not touch. The German iron industry is still in bad shape. The boom there that culminated in 1900 did vast harm and recovery must be slow. Many plants were built in districts that couldn't sustain them and the result is the banks own a great deal of such property, the original owners being thrown out of the business by the depression.

"I saw nothing in any of the countries I visited to support the view that the steel works of the United States will have any serious opposition when they come to the point where they want to place a considerable tonnage abroad. The organization of most of the Continental steel works embodies practically the reverse of the American policy. The director-general is the center of authority; in fact, he is practically the sole authority. He directs the buying and the selling, supervises all building and improvements, personally directs all the operations of the plant. He is on duty from 7 in the morning until 8 at night. Nothing can be done without his personal direction; no step can be taken except through his agency. There seems to be no one in training to succeed him, and the idea of anyone else assuming responsibility even for details seems not to be entertained. Such organizations as are seen in American steel works, where able independent- thinking subordinates, capable of initiative in their own sphere, and in training for the higher places of management, are not known in Germany, at least. The compensation of draughtsmen, salesmen, clerks, and others in subordinate positions is greatly below what we are accustomed to in this country. In the operation of German mills there is practically a seven-day week. They work up to 9 a. m. on Sunday and start again at 4 p. m. The regime of seven-day operation cannot but militate against full output as well as against the best spirit in the working force."

Referring to the price of steel abroad Mr. Bonnell said that the lowest priced contracts made by American buyers for import steel were placed early in the year through English jobbers at £3 17s 6d for sheet bars at Antwerp, or $18.89. Adding freight and duty the cost was between $26 and $27 delivered at New York. Since this early buying prices had risen until the basis today was about £4 17s 6d for sheet bars c. i. f. New York.

At Pecatonica, Ill., is a good looking factory building bearing the sign, "Rent free for manufacturing."

UNITED STATES STEEL CORPORATION.

The report of President Schwab, of the United States Steel Corporation, shows that for the year ended March 31, 1902, there were 13,326,705 tons of ore mined; that the quantity of coke manufactured was 9,079,142 tons and that the furnace product of the Corporation was 7,152,121 tons, or 45 per cent of the total production of the United States. The manufacturing cost of the steel properties of the Corporation for the year aggregated $315,662,881, and of coke properties $12,453,346. The gross earnings of the Corporation's transportation properties were $29,511,012, operating expenses and taxes and manufacturing cost, $16,431,006. The outlay for repairs, maintenance and extraordinary renewals during the year were: Steel making properties, $19,208,335; coke making properties, $881,763; and transportation properties, $4,451,590. Total, $24,541,688. The average number of employes in service during the year was 158,263 and the total of wages paid was $112,829,198.

Following the meeting of the directors of the United States Steel Corporation at New York May 6, it was stated that the syndicate which is to underwrite the $250,000,000 of new 5 per cent bonds will receive a stated commission of 4 per cent, not necessarily on the whole issue, nor solely upon the $50,000,000 cash issue, but upon the actual amount of bonds bought by the syndicate. In brief, the syndicate pledges itself to take up 40 per cent, or $100,000,000 of the total issue. It stands ready, however, to purchase all the bonds not bought by shareholders. In the event of the stockholders taking none of the bonds, a very remote contingency, the syndicate will take the entire issue, for which it will receive a commission of $10,000,000. This commission, according to a director, would come from the expense account of the Corporation.

Obituary.

Thomas J. Stevenson, treasurer of A. M. Byers & Co., Inc., of Pittsburg, died on April 26, of pneumonia. Mr. Stevenson was born near Pittsburg in 1828, and began his business career with the Pennsylvania Salt Co., at Natrona, Pa. He afterwards became connected with the firm of Graff, Byers & Co., which was succeeded by Byers, McCullough & Co., and later A. M. Byers & Co., Inc., having been connected with the financial department of A. M. Byers & Co., Inc., and its predecessors for over 34 years. He was also a director of the Monongahela National Bank.

John G. Fritsch, president and treasurer of the Francis Fritsch Foundry & Machinists' Supply Co., died April 27, at his residence in Cincinnati. He was born 42 years ago.

George W. Grimes, aged 45 years, of Bluffton, Ind., died April 29. He was the owner of the Grimes Foundry & Machine Works.

Christian Roos, formerly of the Wais & Roos Punch & Shear Works, and A. Mill, M. E., are the members of the new firm of Roos & Mill, 2010-2012 Central Ave., Cincinnati. They are now putting in machinery and will begin manufacturing a line of radial drills in about two weeks.

Geo. C. Keene & Co., are laying foundation for their new brick building 80x80 on Florence Ave., Walnut Hills, Cincinnati. They expect to be in their new quarters about Aug. 1.

President Charles M. Schwab and a number of officials of United States Steel Corporation companies, started on an inspection of all the properties of the Carnegie Steel Co., in Pittsburg territory, Wednesday May 7. Other plants of the corporation will also be visited and the inspection will continue for several days.

The Detroit Iron & Steel Co., which is to build a blast furnace on Zug Island below Detroit, organized May 2 by electing D. R. Hanna president; C. C. Bolton, vice president; C. W. Baird, of Detroit, secretary and treasurer, and Frank B. Richards of M. A. Hanna & Co., general manager. The company will have its headquarters in Detroit and an office will probably be erected at Delray near the site of the works.

CARNEGIE STEEL CO. WINS THE MIXER CASE.

The much litigated suit of the Carnegie Steel Co., Ltd., against the Cambria Iron Co. was finally decided in the United States Supreme Court at Washington Monday, May 5, in favor of the Carnegie Steel Co. This decision reverses the United States Circuit Court of Appeals of the Western District of Pennsylvania and sustains Judge Joseph Buffington of the United States Circuit Court sitting in Pittsburg. The decision of Monday is by a bare majority. Five of the justices sustained Judge Buffington's decision in the Circuit Court while Chief Justice Fuller and Justices White, Harlan and Brewer dissent.

This latest and final decision is discussed with interest in the steel trade. The results are far reaching and will involve the payment of millions of dollars to the Carnegie Steel Co. in royalties. While the case decided involves only the Cambria Steel Co., of Johnstown, Pa., the decision will apply to all companies in this country that have been using a mixer in their steel practice and have not paid a royalty to the Carnegie Steel Co. Where the direct process is in use abroad no complications will occur for the reason that the foreign rights were sold to an English company that sold the mixer rights to other companies in Germany, France and England.

The original bill of complaint against the Cambria Iron Co., now the Cambria Steel Co., was filed by the Carnegie Steel Co., Ltd., on Dec. 2, 1895. It stated that on Oct. 31, 1888, William R. Jones, of the Carnegie Steel Co., Ltd., invented a method of mixing iron and secured a patent on the same on June 4, 1889. An injunction was asked for and an accounting. The Cambria Iron Co. replied that it was not infringing upon the patent of Capt. Jones for the reason that it practiced the method of running metal from two or more furnaces into one ladle or vessel for 25 or more years before the patent was granted to the alleged inventor. Claims were further made by the defendant that this method of mixing metal for the sake of securing uniformity was practiced in foundries prior to this date, and for that reason the patents were null and void. Suit was subsequently commenced against the Maryland Steel Co. by the Carnegie Steel Co., Ltd., for an alleged infringement of the mixer method.

The patent granted to Captain Jones is sweeping, apparently covering the method and principle fully. The two claims allowed by the patent office are as follows:

"First—In the art of refining iron direct from the smelting furnace, the process of equalizing the chemical composition of the crude metal by thorough commingling or mixing together the liquid metal charge and subsequently refining the mixed and equalized charge.

"Second—In the art of mixing molten metal to secure uniformity of the same in its constituent parts preparatory to further treatment, the process of introducing into a mixing receptacle successive portions of molten metal uniform in the non-metallic constituents, removing portions only of the composite molten contents of the receptacle without entirely draining or emptying the same, and successively replenishing the receptacle with fresh uniform additions."

Inasmuch as many of the companies that would have been affected by this decision are now consolidated and financed by the United States Steel Corporation, it is extremely doubtful if there will be any accounting between them and the Carnegie Steel Co. This matter will no doubt be adjusted out of court. In the case of the few outside companies, however, it is understood that settlements will be demanded on all the steel made since the introduction of this method in their respective plants. The Cambria Steel Co. has produced 4,000,000 tons of metal on which a royalty will be asked. A feature of the case is the death of the inventor before the granting of letters patent.

Testimony covering several thousand pages of typewritten matter was submitted on the first hearing of the case, among the witnesses being Andrew Carnegie. The case was finally argued before Judge Buffington, Attorney General P. C. Knox and Attorney Thomas Bakewell appearing for the Carnegie Co., and Attorney F. T. Chambers, of Philadelphia, Attorney Dodge, of Washington, D. C., and Attorney J. G. Kay of Pittsburg, representing the Cambria Iron Co. Judge Buffington in an opinion later sustained the patent and granted an injunction against the defendant company. A year later, the Cambria Iron Co. took an appeal from the lower court to the United States Court of Appeals at Philadelphia, which reversed the lower court, on the ground that no infringement had been shown.

Ordinarily a decision of this sort ends litigation, especially a patent case, but the Carnegie Co. carried it to the Supreme Court of the United States, which body allowed the writ of certiorari and the case was reviewed. Application for the writ was made by former Speaker Thomas B. Reed, who ultimately became engaged in the case. The whole case was heard anew. The entire testimony and the opinions of both lower courts were reviewed. The case was argued about two years ago, and the fact that the justices of the Supreme Court ordered a reargument was evidence that the points at issue were of great importance and the members of the court were not clear as to the merits of the case, so many intricacies being involved.

RIOTING MOLDERS RULE IN DETROIT.

The trouble between the Buhl Malleable Co., of Detroit, and the union molders who struck some weeks ago for the unionizing of the plant, culminated last week in a riot. The company has had in its employ during the strike a force of non-union men who were fed and lodged inside the works. The strikers and a great crowd accompanying them gathered at the plant on Friday afternoon, May 2. The trouble began ith the throwing of a brick through a window of the plant. Then followed a volley of bricks and stones. Policemen, of whom 200 were on hand before the crowd dispersed, seized several strikers. The crowd grew turbulent and fought the officers. Four arrests were made, and serious trouble seemed imminent when Police Commissioner Geo. W. Fowle drove into the crowd and announced that Mr. Buhl had decided to close the plant and discharge the men at work. He appealed to the rioters to disperse, and on the announcement that the non-union men were to be set adrift the crowd set up a yell of triumph and promised to leave the premises.

The newspaper accounts say that a committee of the strikers co-operated with the police commissioners and Manager De Long of the works in sending the non-union men out of town. The closing of the works is thought to be for an indefinite time. The strikers have succeeded in dislodging the non-union workmen, but it may be a long time before they will get employment under the conditions they have imposed. The result is a triumph of the mob spirit, and a serious reflection upon the ability of the Detroit city government to guarantee its citizens their constitutional rights.

In a letter addressed to Mayor Maybury, of Detroit, on April 29, the Buhl Malleable Co. went to the limit in conciliation, as will appear from the following extracts:

"First—We will be not only willing, but glad, to sign an agreement between ourselves and our employes for the ensuing year and will allow our employes to select as the agreement which they wish to have signed, any existing agreement between manufacturers of malleable iron and their molders in this entire country, but we would not undertake or agree to add to any of such agreements, any conditions as regards wage rate or hours of labor, or method of work, more orerous than any agreement at this time in existence.

"Second—We will always in the future, as we have been in the past, be glad to have our employes call upon us to discuss any matters in which we are mutually interested, and we will be equally well pleased to have employes represented by a committee, or committees, whenever they may see fit.

"Third—We have no objection whatever to the men in our employ in any department, either in whole or in part, becoming affiliated with any labor organization, and shall never in the future, as we never have in the past, discriminate against our employes because of said affiliation.

"Fourth—We want to pay the same established average rate of wages as is paid in this country by the manufacturers of malleable iron, and furthermore, we are willing to go a step further, if absolutely necessary, and pay a trifle in excess of that rate.

"Fifth—We should furthermore be pleased to conform in every single particular, without any exception whatever, to the standard customs and practices as they may exist in the conduct of plants of this character in this section or in other sections of the country among manufacturers making work of a similar character to ours.

"We also stand ready to take back our old employes without discrimination as fast as we can put them on and to give them preference over other applicants.

"In conclusion, permit us to thank you most sincerely for your very unselfish and disinterested effort to bring about a mutual understanding between parties whose interests are identical and where anything else but the best of good feeling on both sides must always be disastrous to both."

THE MANUFACTURE OF LARGE SEAMLESS TUBES.

The Ehrhardt process for the manufacture of seamless cylinders and tubes was recently described by the inventor, Mr. Ehrhardt, in a paper read before the Society of German Ironmasters, and reported in a recent issue of *Stahl und Eisen*. His experiments were begun as far back as 1883, when it was attempted to roll weldless cylinders in a small rolling mill consisting of one stand of three rolls, Fig. 1. Unfortunately Ehrhardt's earlier efforts were attended with a very limited measure of success, which was mainly due to the lack of a reliable process for preparing hollow blanks of large size, which should present a smooth surface and a uniform thickness of metal throughout. In the case of small blanks, on the other hand, it was not a difficult matter to avoid such irregularities, and the inventor therefore for many years confined his further efforts solely to the manufacture of seamless tubes of small diameter. It was not until 1896 that his appliance was finally perfected for piercing large ingots, upwards of 3½ tons in weight, and rolling them out subsequently into rings in a mill fitted with oscillating rolls. Briefly the process is as follows:

The piercing of the rough ingot is first performed in a hydraulic press of enormous power, after which it is placed on the mandrel of a drawing press and drawn out through dies to a length corresponding to that of the finished tube. It is also essential that the sectional area of the material forming the blank should be exactly equivalent to that which it is desired ultimately to give to the ring in its final shape. During these preliminary operations the material undergoes mechanical treatment of a most severe nature, more especially in the direction of its longitudinal axis. After forming the cylindrical blank it is placed in a pair of rolls, the upper one of which can be easily unshipped from its bearings to enable the hollow cylinder to be slipped over it, while the lower one is held up to its work by hydraulic rams, which exert an absolutely uniform pressure on the piece during the process of rolling. To expedite the operation, and also to diminish the amount of pressure which it is otherwise necessary to put upon the rolls, the bottom roll is arranged to oscillate sideways, during rolling, about a point exactly midway between its bearings, Fig. 2. This confers the advantage of being able to reduce the pressure on the rolls, because instead of having to exert an even pressure over the whole length of the blank, the lower roll, when swung out at both ends, bears only in the center, and in like manner, on coming back into line with the upper roll, the ends of the blank in their turn are subjected to the pressure. The real value of the oscillating motion, however, lies in neutralizing the effect produced by the bending of the rolls themselves. This tendency to bend must be reckoned with, particularly in the case of the rather small upper roll, Fig. 2, because the wall of the cylinder is liable to assume a slight convexity of form—that is to say, it will become thicker at the center than at the outer extremities. By imparting a continuous oscillating movement to the lower roll it is found, however, that this tendency can be completely obviated.

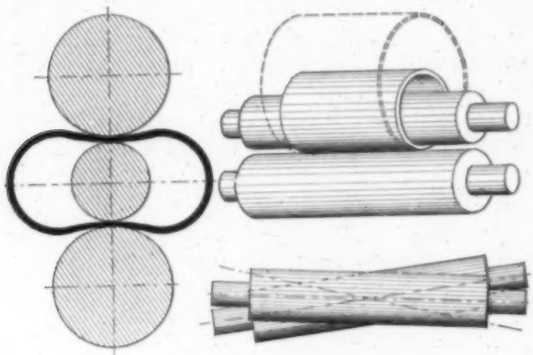


FIG. 1. FIG. 2.

THE EHRHARDT PROCESS OF MANUFACTURING SEAMLESS TUBES.

The true circular form of the blank is preserved during rolling by means of guide rolls, which are capable of easy adjustment to the successive variations in the diameter of the cylinder. Throughout this entire operation the material is worked in a most thorough manner, but only in a circumferential direction, and numerous mechanical tests, both tensile and bending, have proved that plates made by this process are in every way as trustworthy as boiler plates rolled in the ordinary way. The advantages to be derived from the use of such seamless rings in boiler construction are very apparent. The boiler shell, for instance, would have a strength in a circumferential direction equal to the full strength of the solid plate, which implies a considerable diminution in the weight. There would, moreover, be no longitudinal seams at which leakage could occur, and the absence of these would greatly simplify the riveting-up of the circumferential seams. Lastly, a most important economy is secured on account of the great reduction of the work of machining and riveting. The reading of the paper gave rise to an interesting discussion, in the course of which the author was asked whether he could guarantee with certainty the exact diameter and parallelism of the cylinder, and some doubt was expressed whether sufficient accuracy of workmanship could be assured by this method. He maintained, however, that the most perfect precision was possible, and instanced several cases where his skill had been put to extreme tests with the best results.

At a meeting in Schenectady, N. Y., May 5, the stockholders of the General Electric Co. voted to increase the capital stock $19,757,800, to consist of 197,578 shares of par value of $100 each, to $45,000,000, to consist of 450,000 shares. The new issue will be distributed among the stockholders to restore what was given up in 1898, when the common stock was reduced from $32,161,000 to $18,276,000 and the preferred $2,551,200. In July, 1900, the common stock was increased to $24,784,600 for the purpose of retiring $5,298,000 in debentures and the $2,551,000 preferred stock, all of which, except a nominal amount, was called in. The new issue will be distributed so that each stockholder will receive 66⅔ per cent of his present holdings.

F. H. Wigham, metallurgist and manager of Geo. Cradock & Co., of Wakefield, Eng., is now in the United States and will visit the steel making districts. His address is the Hoffman House, New York. Mr. Wigham was co-author with J. E. Stead of a paper on the "Effect of Copper on Steel for Wire-Making" read at the September meeting, 1901, of the Iron and Steel Institute.

The employes of the converting department of the Bessemer plant of the Republic Iron & Steel Co., Youngstown, O., went on a strike last week for an 8-hour day instead of 12 hours. The strike has resulted in a tie-up of the entire plant, and unless adjusted soon will result in a serious shortage of steel.

The Union Machine Co., Fitchburg, Mass., was practically reorganized last week by the election of the following officers: Adams Crocker, president and general superintendent; Emmons Crocker, treasurer and manager; A. S. Morse, assistant manager; the above with H. M. Lathrop form the board of directors.

Announcement is made that by mutual consent Oscar W. Mueller has withdrawn from the firm of Dreses, Mueller & Co., of Cincinnati, and his interest has been acquired by the former co-partners, Henry Dreses, Wm. Gilbert and Chas. Lange. All assets and liabilities are assumed by these partners, and the management of the firm will be as heretofore under the personal supervision of Henry Dreses. The name of the firm is now the Dreses Machine Tool Co..

The Cleveland Furnace Co., of Cleveland, has closed for portions of the land on the Cuyahoga River which it has had under option and additional land may yet be taken. The entire amount on which options were secured was 175 acres. Julian Kennedy has been chosen as engineer and construction work will begin in the near future. The blowing engines will be furnished by the Mesta Machine Co., of Pittsburg.

The Canton Foundry & Machine Co., of Canton, O., has increased its capital stock from $25,000 to $100,000.

ORE HANDLING AT NEVILLE ISLAND.

The furnace of the American Steel & Wire Co., on Neville Island, in the Pittsburg district, is a furnace at which all the iron ore, coke and limestone are received in railroad cars. The iron ore handling plant was built by the Webster Camp & Lane Machine Co., after a plan designed by Mr. G. H. Hulett and is one of the most complete and economical plants yet constructed. It comprises a side-dump car dumper and two conveyor bridges for stocking and reloading purposes, and in general is like the plant at the Ohio works of the National Steel Co., described in *The Iron Trade Review* of Dec.21, 1899. The car dumper receives all loaded ore cars as they come from the railroads, and turns them over, delivering the contents of each into four special bridge cars mounted on 36-inch gauge tracks on top of a transfer car at right angles to the standard gauge track on which the transfer car runs. This transfer car with its four loaded bridge cars is shifted to a position in front of one of the conveyor bridges by a locomotive, which places the transfer car so that the first of the tracks on which bridge cars are mounted comes approximately opposite the approach tracks on the conveyor bridge. The locomotive then returns to the car dumper with another transfer car and empty bridge cars. The bridge meanwhile takes the loaded cars just left, the operator automatically placing the transfer car so that the first track on the transfer car fits the corresponding approach track on the bridge, where the bridge car is connected by haulage cable, pulled up the incline and out over the bridge, and dumped automatically through the bottom into the stock pile.

While the first of the four bridge cars is up on the bridge, the transfer car is again shifted by the operator so that the next loaded car is brought opposite the approach, and the empty track previously occupied by the first car is set opposite a spring switch on the bridge, so that the empty bridge car on its return down is placed in its right position on the transfer car. This is continued until all four cars are empty, when the locomotive shifts in another set of bridge cars and takes the empties back to the car dumper to be reloaded. The bridge cars are designed to handle 17½ to 20 tons each, and are of such capacity that the four cars will receive the contents of any one of the largest or of two of the smallest railroad cars. There are six transfer cars, each with four bridge cars. This number is supplied so that the two conveyor bridges can be kept running at one time, if desired, and so that no time need be lost in receiving cars at the car dumper during the intervals while the bridges travel from one stock pile to another or from one class of ore to another.

The conveyor bridges are self-traveling Gantry cranes, the rear tower of which is mounted on a track set directly on top of the ore bins, so that the cantilever of the bridge extends over the bins and can be used to load directly into them, or into a bin filling car in case the bin is not directly opposite the pile of ore desired.

For taking ore out of stock a drag bucket or grapple bucket is used, which is hung from and operated by a trolley wagon running on a track suspended below the floor beams of the bridge. The drag buckets used here are of the largest capacity ever built for this purpose, handling from 10 to 12 tons of ore at each lift. The grapple buckets are also large capacity, handling from 5 to 6 tons per lift.

The car dumper is 44 feet long, 41 feet high, and 20 feet wide. It is steam operated and has a capacity of about 25 cars an hour. In the bridges the length of the cantilever is 43 feet 6 inches; center span, 250 feet; length over all, about 325 feet. The average height is about 70 feet above the stock pit. The bridges are electrically operated and have a capacity of about 15 cars an hour. The bridge cars have a maximum capacity of 20 tons of iron ore each.

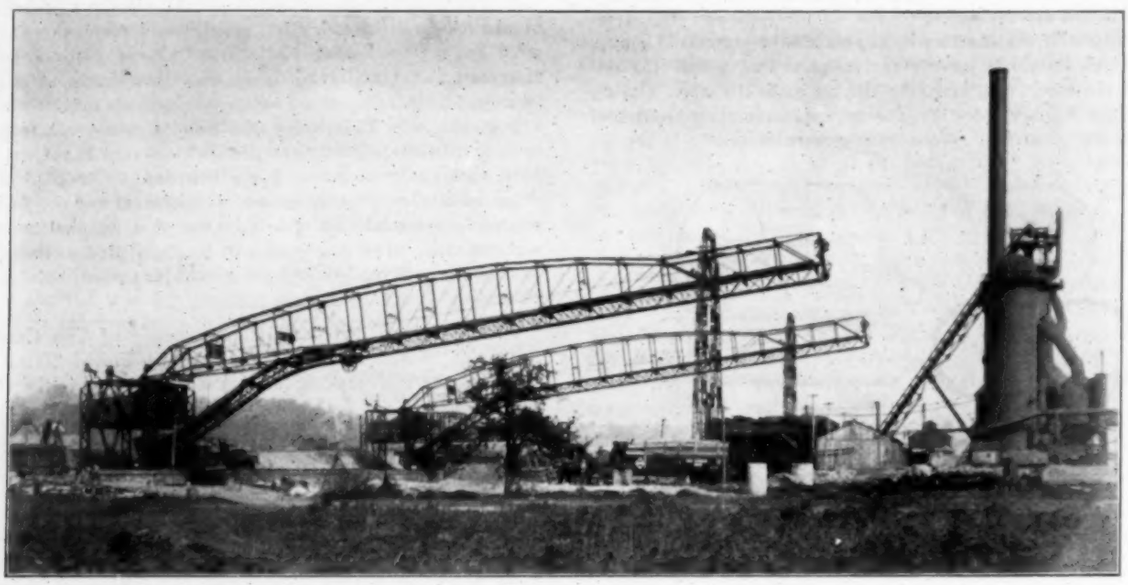


FIG. 1.—THE TWO ORE BRIDGES AND CONVEYORS AT THE NEVILLE ISLAND BLAST FURNACE.

POINTS ON HEAT TREATMENT OF TOOL STEEL.

The surface of metals is liable to oxidation even at a low temperature. Iron surfaces that are polished become blue when exposed to the atmosphere at a temperature considerably below a red heat. If the heat is applied slowly while the surface can be watched it may be seen to change, first to a light yellowish color which becomes gradually darker as the surface is made hotter. This action of the air upon the polished surface of steel is useful to a temperer, as it furnishes him a guide for reducing the brittleness of hardened steel, but retaining the other properties of the hardened piece with its structure unchanged, unless the piece is heated higher than 700 degrees Fahr., below which the blue oxide has been formed, but is driven off at a temperature, and will show itself again and quickly disappear if the surface is rubbed with a piece of sandstone.

The color of oxidation is not a function of the tempered condition of hardened steel, but an indication of the heat between temperatures of about 400 to 700 degrees Fahr. If a temperer polishes off a color that appears at say 580 degrees and then reheats the piece to a higher temperature, say 620 degrees, indicated by a different shade of color, the effect would be the same as though he had taken the higher temperature without polishing the second time, and it would make no difference except in the time taken to do the work, whether the steel was cooled or not before reheating.

All the colors that have been proven and accepted as guides to the temperer, appear to chase each other from the polished surface and show themselves at known temperatures; therefore the method of repolishing and reheating several times may be a suitable way sometimes, but could not be adopted in common

practice. In the table given below, I have named the most reliable and certain colors in their order with the temperature at which the same condition would be caused without oxidation if the steel was heated uniformly away from an oxidizing atmosphere. It should also be remembered that many combinations of these colors may be observed on surfaces variously polished, or when the heat is checked at points between the given temperatures. This is especially true of the violet which causes red spots on the blue if the piece is quenched between 550 degrees and 580 degrees. There is also a mixed color known as peacock, which appears if the conditions are right, between 500 degrees and 550 degrees; but to those familiar with this process, it is well known that closer graduation by the color test is of little value except for special work on known grades of steel.

Guide for Tempering.

Tool steel after hardening and polishing may be tempered as desired by slowly heating it in the open air until the corresponding color appears. If not polished or if heated in a bath these colors do not appear.

TEMPER.	COLOR.	TEMPERATURE.
Very High	Yellowish white or Straw	400 F.
High	Dark Straw	450
	Orange or Gold	490
Medium	Brown	500
	Purple	530
Mild	Violet	550
	Light or sky blue	580
Low	Deep or pigeon blue	600
Soft	Uncertain blue	650
	No temper remains	
	But grain is unchanged	700

The last temper named in this guide can be easily filed, and at 700 degrees the fine or coarse grain that resulted from the hardening heat remains the same, but the temper required for cutting tools has been destroyed. The temper condition indicated by the color is fixed at the given temperature, and will remain so until it is heated higher, therefore quenching to prevent the surplus heat from a tool that has been hardened only on one end from supplying too much heat to the hardened portion, is necessary, but slow cooling is generally preferred when the danger of too much heat can be avoided in any other way.

Guide for Hardening.

Tool steel heated and quenched in water will be hardened and the grain changed or refined (small crystals), as indicated, according to heat used.

RESULTING HARDNESS.	COLOR OF HEAT.	APPEARANCE OF FRACTURE.
Excessively hard and brittle	High yellow or cream white	Coarse grain with brilliant lustre.
Extra hard will break easily	Yellow or orange	Grain open, but not so coarse or brilliant.
Too brittle not strong	High red or lemon	Grain not coarse, but with some bright lustre.
Very hard and strong	Clear red or bright-cherry	Fine grain clear through, no bright lustre (small crystals).
Very strong and hard, except in middle	Low red or dark cherry	Grain fine on the outside, but not in middle.
Stronger than bar, not hard enough	Dark red or black heat	Grain same as the bar.

The degree of heat required to cause the effect shown in the left and right-hand columns varies with the carbon, but for any ordinary steel the color of heat shown above is sufficiently near the truth. If a piece is heated quickly the fifth effect will be more marked, and indicates clearly that time in heating should be carefully considered. This fact is frequently taken advantage of by the hardener, and can be practiced with safety on almost any section that is required to be made hard on the outside only. In the majority of cases, however, for ordinary tool work, it is the most common practice to allow sufficient time in heating for the piece to be evenly heated through before quenching, and I do not here advise any departure from that method, for the most work of the toolsmith.

The coarse grain in steel or iron is caused by a high heat and not by the chill; sudden cooling makes brilliant crystals of a fracture visible to the eye, and has led some men to believe the fallacy that coarse grains are formed in the cooling bath, but the bath only fixes them as they were when hot, therefore the proper hardening heat is at the same temperature whether mercury, cold lead, brine, beeswax, tar, oil, soap, or any other medium is used.

If is is desirable to make the steel more brittle, coarse grained (and presumably harder), a higher heat than the proper refining one must be used, and vice versa as to brittleness and hardness; but the grain is not always changed by such low heats as affect the other properties of the metal; if it is necessary to quench a piece at a heat so high as to make it

FIG. 2.—STOCKING ORE AT THE NEVILLE ISLAND BLAST FURNACE.

coarse grained, in order to produce a required hardness, the bath or the steel must be wrong, or the requirements peculiar. The hardness resulting from a heat higher than that required to refine the grain may be greater or less than that produced from a lower heat, according to the bath used, and the hardness caused by cooling from the proper refining heat in the right kind of a bath may be the maximum hardness for that steel. Farther discussion of this question is unnecessary for our purpose here. A section that will refine and harden properly in water from a given heat may not do the same thing if cooled at that heat in oil, but of such a piece the steel maker says, "will not harden in oil." All steel makers agree on this point. I have made crucible steel in several mills, and have heard the complaint that "cutting tools hardened in oil are not as enduring as when tempered in water." This mistake is made only when an attempt is made to adapt a grade of steel to a purpose for which it was not intended.

Toolsmiths have always known that the heated condition is fixed by quenching, and in the investigations of science no better answer to the question "why does steel harden" has been found, though many interesting theories have been advanced; the only one undisputed agrees with us that the sudden quenching fixes the hot condition, making the metal in a cold state to show itself as it was when hot.

To determine the proper hardening heat, the phenomenon of recalescence peculiar to iron is of value. As this phenomenon is absent in other metals and has not been observed in so-called self-hardening steels, but is clearly apparent during a shorter range of temperature as the carbon point is raised in iron, the period of recalescence has been mistaken for the hardening heat, but it is not, and steel quenched during this period will have streaks of unhardened metal. It is further known that this "point," which was but recently discovered to have an influence of value to steel workers, is indicated by its name; a piece of steel cooling from a bright red heat ceases momentarily to become cooler at about 1,200 degrees Fahr.; at this point the temperature actually rises; the steel "recalesces." This phenomenon is called "recalescence." It may be seen to glow distinctly brighter in a dark room, and the pyrometer marks a rise in temperature.

It is the "second red," the last bright glow peculiar to steel cooling in a dark place, an irregularity in the retardation of the cooling rate, that has been known to steel workers from time immemorial. It may be called the critical point through which steel must pass when being heated, and the temperature above this point to which steel can be heated without injury varies, as the point does with the carbon content, and may also be affected by other ingredients, as other metal alloys must be reduced to a liquid state to change the size and appearance of the crystals. Compounds of iron with other metals would be various affected, but ordinary carbon tool steel is known to be changed structurally while passing through the recalescence point. Therefore, when the maximum hardness is desired it must be heated sufficiently above this temperature to form the grain and structural condition required before all of the iron goes into the hard condition to be fixed by the sudden cooling. Any hardness caused by quenching above the refining heat, which is just above the recalescence period, or from a heat lower than this, is irregular, and should not be called "proper hardening," though it might serve a good purpose in special cases.

This subject will be more easily discussed when the science of metallography gets into more available books. It deals with the structure of metals, and has given us during the last twelve years the terms "cementite" and "pearlyte" to distinguish different formations in steel or iron, and "mastrusite" and "anstrusite" to indicate the structural formation due to hardening. By microscopic study of these formations man is able to discover the more exact effect of heat treatment, and this is leading to the complete answer of the question, why steel hardens, and when and how the maximum hardness is obtained; we accept the phenomenon of hardened steel in its best condition as used by men of the longest and best experience, finding by experiment the proper hardening heat and quenching medium for each particular kind of tool and grade of steel, using the same heat (if it can be obtained by observation of the color of the heat radiated), for all tools of the same kind and grade, and always getting the heat that has been found to be correct, by the use of a pyrometer that ought to be at the service of every steel worker having much valuable stock to manipulate. Without a pyrometer the most careful man must often fail to distinguish the slight variations in temperature which cause the marked and dangerous changes which I have shown as an experiment that ought to be tried often by every toolsmith.—[C. P. Crowe, in American Blacksmith.

TRADE PUBLICATIONS.

The Niles-Bement-Pond Co., of New York, has prepared a neat booklet for distribution at the forthcoming "Crystal Palace Exposition" in England. A few of the standard types of machine tools built at the various American plants of the company are illustrated with some excellent half-tones, and in a number of instances the statement of the average shop production of the tool accompanies the engraving, a matter of practical interest to the visitor to the Exposition. The limited space in the booklet makes it out of the question to show properly the scope of the company's equipment for shipyard, locomotive works or general machine shop purposes.

Bulletins 23 and 24, just received from the Hyatt Roller Bearing Co., of Harrison, N. J., deal with the Franklin Institute comparative tests of the Hyatt flexible roller versus solid steel rollers and the advantages of Hyatt flexible roller bushings as applied to loose pulleys. The reduction of friction, either between the moving parts of any mechanical device or more complicated machinery (or even in shop or office management), is a matter of live interest and growing importance with the trade and the various bulletins published by the company illustrate the application of the Hyatt roller bearing to different classes of work.

The catalogue and price list of the Crane Co., of Chicago, is a portly, cloth bound, volume of 362 7x10½-inch pages, treating of standard, medium and low pressure valves and fittings and steam engineers' supplies. This is the regular line, special catalogues being published on the extra heavy goods for extreme high pressures and heavy hydraulic work. The book is profusely illustrated, has a section devoted to gas and steam fitters' tools and also contains several pages of useful information for the trade.

The Jeffrey Mfg. Co., of Columbus, O., has issued catalogue No. 67 on the Jeffrey "Century" belt conveyors. These are designed for the handling of ores, rock, sand, coal, etc. Many illustrations are given to show the adaptation of the conveyor to various purposes, together with views of crushers, chain, screens, mine locomotives and other equipment.

Catalogue J of the Van Dorn & Dutton Co., of Cleveland, is a small pamphlet on the subject of gearing. A number of tables of pitches and tooth parts, rules for computing gear details, comparative sizes of involute gear teeth are given, and the sizing of bevel gear blanks and worm wheels is briefly treated.

The Keeler Co., of Williamsport, Pa., contracting engineer and manufacturer of fire and water tube boilers, tanks and standpipes, self-supporting steel stacks, riveted steel pipe and complete power plants, has a catalogue of the specifications of the above line. Separate catalogues are specially devoted to water tube boilers and the company's line of mill and engine supplies. Half-tones showing the south end of the company's erecting shop and the west end of the main shop are given in the catalogue.

Catalogue No. 8 of the Cincinnati Punch & Shear Co., of Cincinnati, partly illustrates the line of power punching and shearing machinery rolls, etc., manufactured by this company. The present pamphlet covers some 48 pages, and the descriptive matter and specifications is very clear and complete.

The Clark Automatic Telephone Switchboard Co., of Providence, R. I., has sent us a catalogue descriptive of the intercommunicating system for mills, factories, warehouses, etc. The work contains considerable data of this arrangement to avoid central station annoyance.

An extra dividend of one per cent will be paid by the Niles-Bement-Pond Co. on the common stock of the company, May 15.

No Tariff Revision Called For in the Iron Trade.

General Manager James M. Swank addressed a letter in February to Congressman John Dalzell, of Pennsylvania, member of the House Committee on Ways and Means, giving reasons why the Babcock bill abolishing certain iron and steel duties and reducing others, should not become a law. This letter Mr. Dalzell recently published in the *Congressional Record* under "leave to print." It is as follows:

HON. JOHN DALZELL, *Member of the Committee on Ways and Means of the House of Representatives, Washington, D. C.*

Dear Sir:—In behalf of the American Iron and Steel Association the following statement of reasons why House Bill No. 9056, introduced by Mr. Babcock, of Wisconsin, should not become a law is respectfully submitted for your consideration. This bill proposes to amend Schedule C of the Dingley tariff by placing certain articles therein enumerated in the free list and reducing the duties on others 25 to 50 per cent.

There is No Iron and Steel Monopoly.

House Bill No. 9056 is not accompanied by any reasons for its introduction, but in published interviews its author is represented as justifying its radical provisions by alleging that American iron and steel products, especially the products of the United States Steel Corporation, are being sold in foreign markets at lower prices than are charged to home consumers. Waiving for the present the inquiry whether or not this allegation is correct, there are two unquestionable facts which definitely and conclusively prove that home consumers of iron and steel are not charged extortionate or unreasonable prices for these products. These facts are of common knowledge. First: Prices of iron and steel in this country are fixed by competition and the law of supply and demand. No corporation has a monopoly of their manufacture, or ever can have in this country of boundless individual enterprise, wide opportunities, and widespread natural resources. The corporation alluded to does not today control one-half of the country's aggregate iron and steel capacity, more than one-half being controlled by independent companies, most of which possess ample capital, modern plants, and abundant resources in raw material. Second: The United States Steel Corporation, instead of using its influence to unduly advance prices, has ever since its creation less than a year ago steadily insisted on keeping prices within reasonable limits. The temptation to advance the price of steel rails, for instance, which has been presented in a season of great railroad prosperity, has been resisted, and the price of steel rails is today just the same as it was ten months ago, namely, $28 a ton, a price to which no objection is made by any railroad manager in the country.

The United States Steel Corporation.

The testimony of the officers of the United States Steel Corporation upon this subject should be conclusive. In the recent report of the directors to the stockholders appears this statement:

"The demand for the products of the several companies has been so great that prices could easily have been advanced. Indeed, higher prices have been voluntarily offered by consumers who were anxious for immediate execution of orders, but the companies have firmly maintained the position of not advancing prices, believing that the existing prices were sufficient to yield a fair return on capital and maintain the properties in satisfactory physical condition, and that the many collateral advantages to be gained in the long run by refusing to advance prices would be of substantial and lasting value, not only to the companies but also to the general business interests of the country. The strong position thus taken by the companies for stability in prices, both of raw material and finished products, has had a reassuring effect on the trade, and has contributed greatly toward restoring confidence in the general business situation and creating the present large demand for steel products by dispelling any doubt as to prices in the future."

The New York *Sun*, in its issue of Jan. 31, in commenting upon the above statement by the board of directors, says: "The United States Steel Corporation has so far done exactly what its managers have here said they were trying and will continue to try to do. They have rigidly kept their prices down to the point of reasonableness." The Louisville *Courier-Journal* recently said: "The policy of the Corporation, so far, has been to try to make money by reducing the cost of production, not by advancing the price to the consumer." While pursuing this policy, it may be added, the Corporation has nowhere reduced wages.

The *Commercial and Financial Chronicle*, of New York, the highest financial authority in this country, bears the following testimony, in its issue of Feb. 1, to the conservative course of the United States Steel Corporation in relation to prices. Reviewing our large production of pig iron in 1901 it says:

"One feature in connection with the year's large production and consumption of iron should not escape attention, for it is in one sense really the most striking characteristic of that period. We refer to the fact that, with the demand larger and more urgent than ever before in the country's history, prices were kept within moderate limits. In the case of every one of the leading articles of iron and steel the average of prices for 1901 is lower than the average for 1900, and in most cases it is very much lower. For this result, preventing that extreme upward movement in values which on so many previous occasions has proved disastrous to the iron and steel industry, the policy of the United States Steel Corporation is largely responsible.

"In the early part of the previous year, as will perhaps be remembered, prices had risen to very high figures, but then a decline set in which continued almost to the close of 1900. The beginning of 1901, therefore, found prices at a fairly low level. The business career of the United States Steel Corporation may be said to date from the first of April. Before the organization of this company the destructive competition threatened by the rivalry of the different separate companies which are now embraced in its control acted somewhat to demoralize the iron and steel trades, so that some intending buyers were induced to withhold their orders. With the possibility of disturbance from that source removed, the demand, already large, became more active than before; and if the Steel Corporation had not firmly resisted the rising tendency prices would undoubtedly have quickly recovered to the extraordinarily high figures ruling at the beginning of 1900.

"But the managers of that concern made it a cardinal point in their policy to keep prices at a level only high enough to leave a fair margin of profit; and their action, of course, dominated the trade. The result is that prices at the close of 1901, while ruling above the low figures prevailing at the close of 1900, did not on the whole show any very great advances. The price of steel rails was raised from $26 a ton to $28 in May, but early in 1900 the price had been $35, and the average of rails for the whole year 1901 is only $27.33, against $32.29, the average for 1900. Bessemer pig iron at Pittsburg averaged $16.37 in December, 1901, against $13.75 in December, 1900, but in February, 1900, the price had been $25 a ton. Steel billets at Pittsburg were $34.50 in January, 1900, $19.75 in December, 1900, and $27.50 in December, 1901."

The Bill Makes Invidious Distinctions.

This bill is invidious in this respect, that it aims a blow at our prosperous iron and steel industries while leaving untouched other prosperous domestic industries of equal or almost equal magnitude. Particularly may it be mentioned that the Dingley duties on the products of the farm, the necessaries of life, have not been disturbed in this bill. Iron and steel products have risen with the general advance in values, but not as farm products have risen, except during the short-lived boom of 1899. *Dun's Review* says that the rise in breadstuffs since July 1, 1897, has been little short of 90 per cent, and that meats have risen in the same time nearly 30 per cent, and dairy and garden products 75 per cent. Mr. Babcock makes no attack on the tariff duties which protect the farmers; nor upon the duties which protect our great lumber industry; nor upon the duties which protect any of our great mineral or other industries.

Mr. Babcock's bill is also invidious in another noticeable particular. While transferring to the free list finished or half finished products of iron and steel, or radically reducing the duties on these products, it proposes to retain iron ore in the dutiable list at the rate of duty prescribed in the Dingley

tariff, iron ore being a raw material which is wholly supplied by the bounty of nature. Intelligent advocates of a protective policy for American industries do not, however, deny the right of our iron-ore producers to a fair degree of protection from foreign competition, but that the Dingley duty on iron ore, a raw material, should be continued and the duties on the finished or half finished products of iron and steel should be reduced or repealed altogether is a flagrant violation of the principles underlying a properly balanced protective tariff.

The Imminence of Canadian Competition.

Next to iron ore in the Dingley tariff comes pig iron, upon which, and upon scrap iron and scrap steel, Mr. Babcock would reduce the duty from $4 to $2 per ton. Although often erroneously referred to as a raw material, pig iron is in fact one of the most delicate and troublesome products of metallurgical art, requiring in its manufacture a vast investment of capital and the application of the highest skill by the mechanical engineer, the chemist, and the experts who look after all the details. A modern blast furnace represents in construction and management a larger amount of capital and a larger display of scientific and mechanical skill than is generally supposed. Mr. Babcock proposes to reduce the Dingley duty of $4 a ton on pig iron to $2, but he virtually places it in the free list, because the duty of $2 which he concedes to pig iron is $1 less than the bounty of $3 a ton which Canada now pays to her pig iron manufacturers, who have already entered our markets. Under the stimulus of this and other bounties Canada is rapidly developing important iron and steel industries of her own. A bounty of $3 a ton is paid on every ton of steel ingots produced in Canada and upon every ton of puddled iron bars. The Canadian production of pig iron in 1901 was greatly increased by the blowing in of three large new furnaces by the Dominion Iron & Steel Co. in that year, while another of its furnaces was blown in in January of the present year. Other new furnaces are now being built in Canada and still others are projected. The annual capacity of the furnaces that have been built or are now being built in Canada is not less than a million tons. Canada now has 14 completed blast furnaces, 4 furnaces building, and 4 projected furnaces. It has also 18 completed rolling mills and steel works and 2 building. It will very soon be able to make nearly a million tons of steel annually and to roll nearly a million tons of iron and steel products.

Canada has in very recent years developed two large iron ore fields—one the Wabana district, on Belle Island, Newfoundland, and the other the Michipicoten district, on the northern shore of Lake Superior. Immense deposits of excellent iron ore are found in these two districts. At a very early day, even in this year, Canada will become an important rival of the United States in the production of iron ore and iron and steel. The Dominion Iron & Steel Co. is already shipping large quantities of pig iron to England and Scotland and it has commenced to make shipments to the United States. In 1901 Canada shipped to this country 160,000 tons of Michipicoten iron ore. Reduce our present duty on pig iron and Canada would flood our markets with its pig iron. The production of pig iron in Canada in 1901, as ascertained from the manufacturers by the American Iron and Steel Association, amounted to 244,976 tons, as compared with 86,090 tons in 1900. Put iron and steel finished products in the free list and Canada will be kept busy on American orders.

Exports of American Iron and Steel Products.

It is not necessary to consider in detail the remaining provisions of House Bill No. 9056. The most important of these provisions provide for absolute free trade in iron and steel products. It is enough to say on this subject that the experience of this country under the Wilson tariff act should be a warning to everybody that even an approximation to free trade in our fiscal legislation is destructive of national prosperity and disastrous to the political party that supports this British policy.

Now as to exports of American iron and steel products to foreign markets: Statistics show that a large part of these exports in very recent years has been composed of pig iron, steel rails, plates and sheets, and structural iron and steel, the last named embracing steel bridges. These are largely but not wholly new features of our export trade. Other forms of iron and steel we have exported for many years. A few years ago, beginning in 1893, there was a great depression in our iron and steel industries and prices were abnormally low and unremunerative; wages in the iron trade were also greatly reduced. Soon afterwards there was developed a boom in the iron and steel industries of our European competitors, particularly Great Britain and Germany, and their prices went up. This was our opportunity. A serious and prolonged engineering strike in Great Britain subsequently broadened this opportunity. We began for the first time to receive foreign orders for pig iron, steel rails, and ship plates in large quantities, and for steel bridges; the foreign orders for other forms of iron and steel also naturally increased. Our exports of iron and steel first exceeded our imports of these products in 1893, and thereafter until 1901 they steadily increased, but in 1901 they began to decline seriously. The German boom in iron and steel ended in 1900 and so also did that of Great Britain. Prices in both countries have since steadily fallen. In 1899 a boom began in the iron and steel industries of our own country, from which there was a reaction in 1900, followed in 1901 by an improvement in demand and a moderate advance in prices. With an increase in demand and prices in our own country and a shrinkage in demand and prices abroad it can easily be seen that our exports of iron and steel would necessarily decline. In pig iron, steel rails, ship plates, and steel bridges the decline has been of a very marked character.

In the calendar year 1900 we exported 286,687 tons of pig iron, but in 1901 we exported only 81,178 tons. In 1900 we exported 356,245 tons of steel rails, and in 1901 we exported 318,055 tons. Of steel plates and sheets we exported 45,534 tons in 1900 and 23,923 tons in 1901. Of structural iron and steel, largely in the form of bridges, we exported 67,714 tons in 1900 and 54,005 tons in 1901. There has also been a decline in 1901 in the exports of some other iron and steel products, the total exports of iron and steel and manufactures thereof in 1900 amounting in value to $129,633,480 and in 1901 to $102,539,797. The shrinkage in our iron and steel exports in 1901 has been conspicuously in tonnage as well as in values. Today the exports of all heavy iron and steel products have almost ceased.

Foreign Competition in Our Markets.

The foregoing summary of the causes of our large exports of iron and steel in recent years and of the recent decline in these exports is necessary as a refutation of the charge so frequently made that our iron and steel industries have captured the world's markets. They have entered the world's markets but they have not captured them. Nor have we absolute control of our own iron and steel markets, as many persons suppose. In the calendar year 1900 we imported iron and steel and manufactures of iron and steel to the amount of $20,443,911, and in 1901 our imports of these commodities amounted to $20,394,995. These are foreign values. Our imports of iron and steel are today increasing, notwithstanding the Dingley tariff. The *Iron Age* for Jan. 16 reports the sale of 3,000 tons of foreign billets, for delivery at Youngstown, O., at $27.50 per ton, with further business pending. It adds that a number of Eastern consumers are now using small quantities of foreign steel. The *Iron Trade Review* of the same date says that a large quantity of German Bessemer pig iron has been sold for delivery in this country, and it notes the sale of 7,000 tons of English Bessemer pig iron also to this country. It says further that "a recent sale of German spiegeleisen for export to the United States indicates that our steel makers have not been able to supply their wants from such of their furnaces as ordinarily run on spiegel," and adds that "the importation of steel is also expected to grow steadily in the coming months." A telegraphic dispatch from Berlin, Germany, to the London *Iron and Coal Trades Review* of Dec. 6, 1901, says: "Our exports continue to increase. German manufacturers have even shipped to America sheets for tin plates, and even thick iron sheets, also half finished products; and in the month of October the quantity of the latter and of finished products exported was nearly equal to half our total production of pig iron."

These and other increased importations of iron and steel would not be possible if foreign prices had not fallen to much lower figures than have prevailed in recent years, and if German and British iron and steel industries were not now

greatly depressed. Our own prices are not excessive. They are much lower than they were two years ago.

English trade journals of recent date show how rapidly the prices of British iron and steel have fallen within the last two years. In January, 1900, steel rails at Cardiff were quoted at £7 10s.; in January, 1901, they were quoted at £6; and in January, 1902, they were quoted at £5. Steel ship plates at Glasgow were quoted at £8 10s. in January, 1900; at £6 15s. in January, 1901; and at £6 2s. 6d. in January, 1902. Iron and steel in other forms show similar shrinkages in price. In Germany prices have fallen so low that, even with the low prices now prevailing in Great Britain, English trade journals complain that German iron and steel are being sold in large quantities in British markets. In Belgium prices are also at a very low ebb.

It may be frankly said that some recent importations of iron and steel are the result of a temporary scarcity of two or three products, due to the enforced stoppage last summer of many works in consequence of the Amalgamated strike, followed by the wholly unexpected inability of the railroad companies ever since to move iron and steel raw material and finished products with reasonable promptness. Our productive capacity in all iron and steel lines is today fully equal to the country's wants, but we have not for six or seven months, for the reasons above mentioned, been able to utilize the whole of this capacity. The present scarcity of a few iron and steel products can not last long, but the importations which it has made possible, inconsiderable as they are, teach this plain lesson, that, if they can take place with the Dingley tariff rates in full force, and with our present reasonable prices, they would be immensely swollen if House Bill No. 9056 should become a law. "If they do these things in a green tree what shall be done in the dry?"

Special Advantages of Our Foreign Competitors.

Whether our importations of iron and steel at any time come from Great Britain or Germany, or any other country, the fact should never be lost sight of that our tariff duties on these products are always largely neutralized by the low ocean freight rates on these importations, and particularly when good times in our own country and bad times in Europe are contemporaneous, as they are today. What are termed tramp vessels call at our ports in large numbers for grain, petroleum, and coal as return cargoes. That these vessels may be properly ballasted on the inward voyage their owners are glad to accept all such heavy products as iron and steel at merely nominal freight rates, frequently as low as $1 a ton and sometimes as low as 25 cents a ton. These low freight rates aid foreign iron and steel manufacturers materially in gaining an entrance to our markets, especially as our own manufacturers must pay higher rates to the railroads to reach important points of consumption on the Atlantic and Pacific coasts and on the Gulf of Mexico. Subsidized French vessels also call at San Francisco for grain.

Just here it is important to remember that German iron and steel manufacturers, operating through their syndicates, habitually make one schedule of prices for home consumers of their products and another schedule for their foreign customers, thus committing as a matter of habitual and daily practice the very offense with which our own iron and steel manufacturers are now charged and against whom House Bill No. 9056 is directed. If this bill should become a law it would greatly help German manufacturers to sell to us through their syndicates iron and steel products at cut prices with which our own manufacturers could not hope to compete. This would be a ridiculous display of statesmanship. We would be punishing our own people for occasionally selling iron and steel to foreigners at lower than home prices, and we would be rewarding our German competitors for adopting and systematically adhering to the very same policy.

It will be seen from what has been stated that, if House Bill No. 9056 should become a law, our markets would be at once flooded wih European iron and steel. The demand for the iron ore of our Lake Superior region, the protective duty on which is retained in this bill, would at once decline. Of what avail would then be the protective duty? This bill would oppose absolutely no obstruction to the shipment to this country of the surplus iron and steel products of Europe. Canada would also be a formidable competitor in our iron and steel markets, as has already been shown. She will be a competitor any way!

Prices of Iron and Steel to Foreign Buyers.

With regard to the prices at which our iron and steel products have been sold abroad it can be said with entire frankness that, while there have been some sales made at lower prices than have been charged to domestic consumers, the large majority of the sales have been made at the same prices as have been obtained at home or at even higher prices. When lower prices have been charged the inducement to do this has been to dispose of a surplus, as during the years of depression following the panic of 1893 or during the reactionary year 1900, or to secure entrance into a desirable foreign market, or to retain a foothold in a foreign market that has already yielded profitable returns. These reasons for the occasional cutting of prices require no defense. They are akin to the reasons which daily govern sales of manufactured and all other products in domestic markets.

Even in years of prosperity it sometimes happens that a rolling mill or steel works, when running to its full capacity, produces a surplus of its products beyond the immediate wants of its customers or of the general market. If this surplus can be sold abroad, even at prices below current quotations, it is better to do this than to reduce production by stopping the rolling mill or steel works for a few days or even for one day. The men would not only lose their wages during the stoppage but the manufacturers would lose in many ways. As one incident of the stoppage the home consumers of their products could not be supplied so cheaply as when the plants are running full. A moment's reflection will convince any candid man that the manufacturing establishment that is not kept constantly employed, whether it produces iron and steel, or cotton goods, or woolen goods, or pottery, or glassware, or any other articles, can not be operated so economically for its owners or so beneficially for its customers as the establishment that is kept running six days in the week and every week in the year.

It should also be remembered that our tariff legislation for at least a generation has encouraged our manufacturers to seek foreign markets by remitting nearly all of the duties levied on imported raw materials when these raw materials enter into the manufacture of exported finished products. Under the operation of this drawback system our iron and steel manufacturers have been able to manufacture their products intended for foreign markets at a much lower cost than they could supply similar products to home consumers. The London *Engineering* for Jan. 17, this year, says of this drawback system: "A certain amount of trade is brought into the country that would otherwise be missed and no one loses anything." It might have added that the raw materials we import and subsequently export in the form of finished products furnish employment to thousands of American workmen.

Official Record of Prices to Foreigners.

The official statistics furnish the only trustworthy information of the prices at which our iron and steel products have been sold to foreign buyers. The average value of the 286,687 tons of pig iron shipped abroad in 1900 was $16.23 per ton, and the average value of the 81,178 tons shipped abroad in 1901 was $15.52 per ton. The average value of gray forge pig iron at Pittsburg in 1900 was $16.90 per ton, and in 1901 it was $14.20 per ton. The average value of the 356,245 tons of steel rails exported in 1900 was $30.58 per ton, and the average value of the 318,055 tons exported in 1901 was $27.13 per ton. The average value of all steel rails sold to domestic consumers in 1900 was $32.29 per ton, and the average value of similar sales in 1901 was $27.33 per ton. These illustrations, bearing in mind our drawback system, are sufficient to establish the general proposition that our iron and steel products have not been sold to foreigners at notably lower prices than they have been sold to our own people.

How Great Britain Captures Foreign Markets.

Mr. Babcock and others, who are just now complaining of occasional sales abroad of American iron and steel at lower prices than they are furnished to home consumers, wholly forget that our British manufacturing rivals have for generations not only practiced the same trade policy that is now so vigorously condemned but have done so with a wholly indefensible

motive that Mr. Babcock will not venture to attribute to our own manufacturers. These British manufacturers have not only sought to extend their trade abroad by lowering their prices but they have done this with the express purpose of destroying the manufactures of other countries. Here are some proofs that our own country has been one of Great Britain's slaughter markets:

In 1816 Lord Brougham, in a speech in Parliament advocating the increased exportation of British goods to the United States, declared that "it was well worth while to incur a loss upon the first exportation, in order by the glut to stifle in the cradle those rising manufactures in the United States which the war has forced into existence contrary to the natural course of things."

In 1854 a British Parliamentary commission reported as follows: "The laboring classes generally in the manufacturing districts of this country, and especially in the iron and coal districts, are very little aware of the extent to which they are often indebted for their employed at all to the immense losses which their employers voluntarily incur in bad times in order to destroy foreign competition and to gain and keep possession of foreign markets. . . . The large capitals of this country are the great instruments of warfare against the competing capital of foreign countries, and the most essential instruments now remaining by which our manufacturing supremacy can be maintained."

It was only after a long and hard fight that the manufacturers of this country were enabled to overcome this brutal British competition. Now that American products have successfully entered British markets and other markets Mr. Babcock would so legislate as to make it difficult for our iron and steel manufacturers to keep control even of their own home markets, for it should be plain to everybody that putting iron and steel in the free list means the partial restoration here of the odious British manufacturing monopoly from which we have recently been delivered, or else it means a reduction of American prices and wages to the normal British standard, which no sensible American wants. British and Continental economic and social conditions possess no attractions that commend them to the people of this country.

The Danger of Over-Confidence.

Instead of a demand being now made to punish American iron and steel manufacturers because of their enterprise in seeking foreign markets, and thus furnishing additional employment for American labor, even in the conversion of foreign raw materials, those who have the welfare of all our industries at heart should jealously guard our own markets against the foreign competition that is always active and aggressive and is even now threatening the prosperity which has been so marked for the last three years. Official statistics just published show that our exports of domestic merchandise in 1900 amounted to $1,453,010,112 and in 1901 to $1,438,083,990, a decrease of $14,926,122, while our imports of merchandise in 1900 amounted to $829,149,714 and in 1901 to $880,421,056, an increase of $51,271,342, making the total loss in our foreign exchanges last year $66,197,464.

There has been entirely too much thoughtless boasting of our ability to gain and keep control of foreign markets for our manufactured products. In cheap labor our European manufacturing competitors still possess one advantage over our own manufacturers that should never be lost sight of, nor will they hesitate to adopt our latest and best manufacturing methods. They are now doing this and are also watching our markets like hawks. We should always be on our guard against their competition, and more particularly at a time when the home demand for some of their products has so declined that they are eager to book foreign orders at exceptionally low prices.

I am, sir, very respectfully, your obedient servant,

JAMES M. SWANK, General Manager.

The Niles-Bement-Pond Co. has recently secured a number of orders for electric cranes for foreign shipment through its New York office. The cranes will be manufactured at the Philadelphia Engineering Works, Philadelphia, Pa., one of the subsidiary plants. One 60-ton and one 20-ton crane will be shipped to Monterey, Mex.; a 10-ton crane to Coventry, Eng.; one 25- and one 10-ton crane to Hong Kong, China.

INFERIOR STEEL IN AN EXPLODED BOILER.

Prof. R. C. Carpenter, who was one of the witnesses before the coroner's jury in the case of the Penberthy Co. boiler explosion, at Detroit, writes at length in *Power* of the results of the various tests to which the steel in this boiler was subjected. Referring to the bending and tempering tests, and also to the results of chemical analysis, Prof. Carpenter says:

"Specimens were reserved for the bending and tempering tests. In this test the piece was first bent by pounding when cold with a hand hammer until the sides made an angle with each other of somewhat less than 90 degrees. The specimen was then put under a power hammer and pounded until the sides were flat and so as to make an angle with each other of nearly 180 degrees. None of the specimens from the exploded boiler stood this test without cracking, while all the specimens taken from the boiler which did not explode showed no signs of cracks. No difference was observable either in hardness or in bending property after the specimens had been heated to a cherry red and were suddenly quenched.

"The writer sent portions of the chips from milling from several of the top sheets and also from several of the bottom sheets to the Pittsburg Testing Laboratory, who reported as follows:

	Bottom Sheet per cent.	Top Sheet per cent.
Carbon by combustion	.170	.167
Manganese	.40	.43
Phosphorus	.078	.077
Sulphur	.035	.033
Silicon	.006	.014

"Prof. Cooley sent to Mr. Oscar Textor, a chemist of Cleveland, O., a portion of several test pieces from which he obtained the following results for the phosphorus, sulphur and carbon contents expressed in parts of 1 per cent:

No. of Test piece.	Phosphorus	Sulphur.	Carbon.
2	.084	.035	.17
6	.082	.034	.15
8	.081	.034	.15
12	.073	.027	.14
26	.098	.039	.18
30	.090	.039	.17

"Mr. Textor stated in his testimony that the phosphorus content was very irregular and that the above results were the average of a number of determinations. For instance, in specimen 26 the Phosphorus determinations for different parts of the same specimen gave, respectively, 0.095, .098, .098, .104, the average being as given above.

"All these various tests indicate a quality of steel which would not be accepted in most of the boiler specifications at present in use. Thus, for instance, the specifications adopted by the American Boiler Manufacturers' Association contain the following requirements for the steel in a boiler:

"'Shell plates exposed to the direct heat of the fire or the gases of combustion, as in the external shells or heads of externally fired boilers, or plates in which any flanging is to be done, to have from 60,000 to 65,000 pounds tensile strength; elongation not less than 27 per cent in 8 inches; phosphorus not over .03 per cent, sulphur not over .025 per cent.

"'For all plates the elastic limits to be at least one-half the ultimate strength; percentage of manganese and carbon left to the judgment of the steelmaker.

"'Test section to be 8 inches long, planed or milled edges; its cross-sectional area not less than one-half of one square inch, nor width less than the thickness of the plate.

"'Bending Test.—Steel up to ½ inch in thickness must stand bending double and being hammered down on itself; above that thickness it must bend around a mandrel of diameter of 1½ times thickness of plate down to 180 degrees. All without showing signs of distress."

"The effect of phosphorus in excess is to make the steel brittle when cold and a comparison of the amount of phosphorus found in the various specimens of the exploded boiler that was analyzed as compared with that permitted in the above quoted specifications, shows that the phosphorus was very largely in excess of that which should have been found in good steel. This excess of phosphorus corresponds with the small percentage of elongation and reduction of area shown by

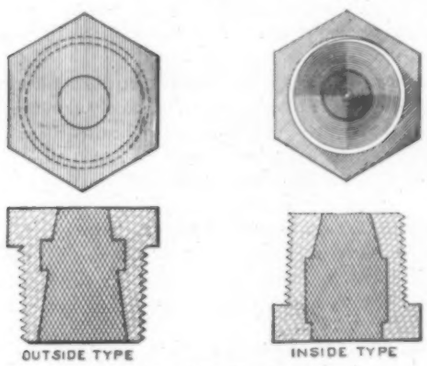
testing and doubtless serves to explain the peculiar kind of fracture which was found in the exploded boiler. This fracture was in the top sheet in the lap of the riveted joint and close to the line of rivets. It took place at a point where the end of the sheet was firmly held by the rivets and was probably caused by the internal vibrations due to variation in pressure and temperature which caused a motion of parts of the shell which, although exceedingly slight, was sufficient to flex the sheet backward and forward through an exceedingly small angle around the riveted joint as a center. The metal being of an exceedingly brittle nature was in this manner cracked. The crack existed in the lap of the longitudinal joint in a position where it could not be detected by observation or test; it probably increased until the strength of the boiler shell became less than sufficient to withstand the pressure. The result was a sudden liberation of the energy of the boiler."

The following editorial comment is made in the same journal:

"Suppose a boiler manufacturer should make a boiler out of tank steel, put together by the cheapest kind of help and in the most hurried and careless fashion, with drifted rivet holes and tortured seams full of hidden cracks and weaknesses, and sell it as a first-class boiler capable of safely withstanding the pressure and the strains put upon it in ordinary use. What could be done to him if the boiler exploded and killed a hundred people? If the verdict arrived at by the jury which investigated the Penberthy explosion is in accordance with the facts, the case against the builders of the boiler which exploded at the Penberthy works on Nov. 25, 1901, and caused the death of thirty people, differs from that above supposed only in degree. Such expert observers as Profs. W. E. Cooley and R. C. Carpenter testify that neither in material nor workmanship was the boiler up to the specifications and the coroner's jury fixes the responsibility for the explosion upon the builder."

LUNKENHEIMER FUSIBLE PLUGS.

Fusible plugs have been made in boilers for a great many years, and the Government, recognizing their important function, requires that all plugs used on boilers of steam vessels should be made of bronze and have no other filling but pure



LUNKENHEIMER FUSIBLE PLUG.

Banca tin. Many plugs have been manufactured which are filled with fusible alloys composed of other metals, which, although melting at very near the same point as Banca tin, were not absolutely reliable. Since the disaster at Philadelphia last fall, the United States Steamboat Inspection Service of the Treasury Department has issued a circular requiring that all fusible plugs be filled with pure Banca tin and stamped with the manufacturer's name, and that an affidavit setting forth this fact should be filed with the inspector having charge of the boiler inspection at whatever point the plugs are used.

The Lunkenheimer Co., of Cincinnati, has manufactured fusible plugs for a number of years, which comply with these specifications, and has made affidavit before the United States Steamboat Inspection Service that its plugs comply with these requirements. Herewith are illustrated two forms of the Lunkenheimer plugs, the outside and inside patterns, to be screwed in either from the inside of the boiler or from the outside through the fire box or shell.

NEW BRIDGE AND STRUCTURAL WORKS CAPACITY.

There has been a marked increase in the past two years in the producing capacity of the country in bridge and structural work. Some of the recent incorporations and their plans and the improvements recently made or to be made by existing companies, are noted by the *Railroad Gazette* as follows:

The West Virginia Bridge & Construction Co. is the most recent company formed to build bridges. Its capital stock is $500,000 and it will build a plant in Wheeling, W. Va. The directors are: C. R. Hubbard, president of the Wheeling Steel & Iron Co.; George A. Laughlin, of the Laughlin Nail Co.; J. H. Barrett, of Pittsburg, formerly with the Keystone Bridge Works, and recently manager of the Columbia Bridge Co., of that city; W. E. Stone, W. A. Wilson, J. M. Brown, J. M. Holloway. Mr. Barrett will be general manager. The company will also make general structural work and the manager will have charge of establishing the plant. It is said work will be begun soon and that the contracts for buildings and machinery will be let within a week or so.

The Riverside Bridge Co. has an application before the West Virginia Legislature to incorporate with a capital stock of $200,000. It proposes to locate north of Martin's Ferry. The application is signed by Nelson E. Whitaker, Henry Schmulbach, John A. Howard, F. J. Park and O. R. Wood.

A large plant is being built at Berlin, Conn., by the Berlin Construction Co., of that city. The company has since last May been operating, under lease, the Pottsville Bridge Works, at Pottsville, Pa., the capacity of which is about 3,000 tons per annum, principally structural work. Its new works in Connecticut, which will be operated entirely by electricity, will have a capacity of 6,000 tons per annum. It has already bought a complete new equipment for the Berlin plant.

Another new bridge plant in New England is that of the Boston Bridge Works, which has been entirely rebuilt within the past year and a half. Since the fire which destroyed the former works the company has been using temporary shops. The new works will turn out, when fully equipped, from 18,000 to 20,000 tons per annum. The buildings are of brick and steel construction to make them as near fire-proof as possible, and the lay-out and equipment is thoroughly modern in every particular.

The Riter-Conley Mfg. Co., of Pittsburg, Pa., is making extensive improvements. It has just finished a new office building at Pittsburg, and is now extending its main structural shop at its Allegheny plant on Preble Ave., Allegheny. This extension will be approximately 120x225 feet, provided with electric traveling cranes. The company is also erecting the steel frame for a new plate works shop at Leetsdale, on the Pittsburg, Fort Wayne & Chicago Railroad, about 15 miles below Pittsburg, on the Ohio River. In this instance the main shop is approximately 85x600feet long, with a power house 50x125 feet, and a sheet-iron shop 50x250 feet. This plant will be provided with electric overhead traveling cranes and all the machinery is to be operated by electric power, to be supplied by alternating current generators driven by gas engines. This plant for the present will be a branch of the Pittsburg Works, which will still remain in operation.

The works of the Virginia Bridge & Iron Co., at Roanoke, Va., have an annual capacity of 10,000 tons, an increase of about 3,000 tons in two years. The punching and riveting capacity of the works has been increased during this time and the company contemplates adding several heavy cranes to facilitate the handling of material. It is now negotiating for these cranes. It also has under consideration further improvements to increase the capacity of its shops, but has not yet made any decision as to the extent of the improvements.

The capacity of the Structural Iron & Steel Co's. works at Baltimore is 6,000 tons per annum. The company is now making an addition which, with the new machinery and increased facilities for handling work, will add about 25 per cent to its capacity.

The Bellefontaine Bridge & Iron Co., at Bellefontaine, Ohio, has just finished a 50x60 feet addition to it works. The capacity of the plant at present is about 3,000 tons, an increase of 500 tons in two years.

The Joliet Bridge & Iron Co. has increased the capacity of its plant 50 per cent in two years, and now has a capacity of

5,000 tons per annum. The company has under consideration some improvements that will increase the capacity, but nothing definite has been decided. The company has of late installed electric power for its entire plant. Its present business consists in making highway bridges and structural work, mostly factory buildings, public buildings, street car barns and the smaller class of railroad bridges.

At Elkhart, Ind., the machinery of the new plant of the Elkhart Bridge Co. was started on Mar. 17, and it is expected to have the full plant in operation within a few days. The plant covers four acres. The machinery is all driven by electric motors. F. W. Fahlgren is the general superintendent. Another Indiana company that has increased its capacity 50 per cent in two years is the Attica Bridge Co. The company has just finished improvements at a cost of $7,000.

In the northwest, where more steel highway bridges are being built than formerly, the bridge plants have also been enlarged quite materially in the past two years. The Wisconsin Bridge & Iron Co., at North Milwaukee has increased its capacity 40 per cent in that period; the works now having an annual capacity of 15,000 tons.

The plant of the American Bridge Co., at Milwaukee, formerly the Gillette-Herzog Mfg. Co., is to be greatly enlarged, probably doubling the present capacity.

The Modern Steel Structural Co., at Waukesha, Wis., is a new concern, and has a plant that will turn out 500 tons a month. The only improvement made at the works since the completion was the addition of a small power house.

The Groton Bridge Co., at Groton, N. Y., is also a new company just starting in business. It is now erecting shops which, when completed, will have a capacity of about 2,000 tons per month, but it will be some months before it will be able to do any great amount of business.

The capacity of the bridge works of the Passaic Rolling Mill Co., at Paterson, N. J., is about 12,000 tons per annum. In the last two years the works have been modernized by improved arrangement and addition of new tools and some extensions to buildings. Some quite extensive additions are proposed, but the plans are not yet fully decided upon.

The Phœnix Bridge Co., at Phœnixville, Pa., whose works were started in 1790, at which time they consisted of a rolling mill and nail factory, is now the largest concern outside the American Bridge Co., making its own steel and all parts which go to make a complete bridge. The latest improvements to the Phœnix Bridge works, that is, 1898 up to date, consist of four new 40-ton open-hearth furnaces and two four-hole soaking pits for the steel department and additional gas producers and boilers; the open-hearth department being equipped with electric charging machines and with electric traveling cranes for charging and drawing ingots in blooming mill.

The beam mill has been entirely remodeled, the equipment consisting of two heating furnaces with capacity of 35 tons each of blooms, the blooms being charged into and drawn from the furnaces with a Wellman-Seaver charging and drawing machine, in connection with transfer car, which are all electrically driven. The rolls are driven by a pair of Mackintosh, Hemphill & Co.'s reversing engines, 28-inch x 48-inch cylinders. All the material is handled at the rolls by a pair of Wellman-Seaver electrically driven tables, it being one of the most complete mills of its kind in the United States. The product of all the mills is loaded directly on cars from the cooling pits by electric overhead traveling cranes.

In the bridge shop, electric cranes have been installed and heavier machinery added, a number of machines being driven by individual electric motors. These improvements have doubled the capacity of the works until at present they are turning out 150,000 tons a year. The hydraulic department of the Phœnix Bridge Co. is capable of forging the largest eyebars ever made, one of which was illustrated Jan. 31, p. 73. The testing machine of the Phœnix Bridge Co. is the largest in the world, 2,000,000 pounds capacity both for tension and compression.

Of the recent reports of contemplated bridge plants, one says that the Penn Bridge Co., at Beaver Falls, Pa., is considering increasing its capital to make extensive additions to its plant, but the company is not ready to give out information. Another report is that the LaBelle Iron Works, of Steubenville, O., will extend its Wheeling, W. Va., plant and make structural steel.

TENNESSEE COAL, IRON & RAILROAD CO.

NEW YORK, May 7.—The annual report of the Tennessee Coal, Iron & Railroad Co., covering the year ending Dec. 31, 1901, is made public here today. The profits from mining and manufacture, $1,640,104.94, are compared with $2,339,298 in 1900 and $1,864,179 in 1899. The report of President Bacon and the statement of Secretary and Treasurer Beecher are as follows:

To the Stockholders of the Tennessee Coal, Iron & Railroad Company:

At the close of the year 1900, the floating indebtedness of this company amounted to $4,120,000, of which $920,000 was for account of current business, the balance of $3,200,000 representing borrowed money and overdue accounts. Your board of directors decided to issue a general mortgage for $15,000,000;

$10,653,500 to be used for retiring bonds then outstanding as they fell due;
$3,000,000 to be sold and the floating liabilities reduced;
$1,346,500 to be sold and the proceeds expended for additions and betterments.

Up to this date, April 17, 1902, it has been necessary to market only $3,000,000 of bonds, the money received for them reducing floating obligations, the balance required (except $100,000 still due) having been taken from earnings. All bills are now met promptly or anticipated, and discounts secured. During 1901, for construction and improvements the sum of $759,000 was expended, and the company has, or will soon have under way, at its mines, furnaces and mills, additions and improvements costing the aggregate sum of $1,020,000. Further important additions have practically been decided upon.

Under the system of accounting that was followed prior to 1901, we believe that to real estate or plants were charged many items that should have been charged to cost, thus increasing the book value of your property and the profits shown, and reducing the apparent cost of output. The method now followed is believed to be conservative. Had the market price of pig iron during 1900 continued through 1901, the net earnings of the company would have been $1,704,228.24 greater than now shown. An examination showed that many of the plants for manufacturing and the equipment at others were overvalued and that accounts receivable included large sums that were in no sense receivable. In the readjustment, plants, investments, accounts, and bills receivable were reduced by the sum of $6,424,000.

This company holds in fee large quantities of iron ore and coking coal, estimated as sufficient to supply our present furnaces sixty years and so located as to insure cheap delivery. The iron mines are being put in order to make a large output at a reduced cost, and the coal mines are receiving some attention.

In the construction of your steel mill, several new and untried devices were introduced. Their removal and the substitution of others has been costly, both in time and money. The output, which is now about 14,000 tons per month, will be increased.

Your directors recommend that the net earnings be used to improve or replace your different plants, making them conform more closely to the best ones of like character. A statement from the secretary and treasurer, showing the operations of the company for the year 1901 and its present condition, is attached hereto. DON H. BACON, Chairman.

General Financial Statement.

Gross Earnings from Operations for the year were as follows...		$1,724,137 90
Profits from Mining and Manufacturing	$1,640,104 94	
Rents	76,661 69	
Miscellaneous	7,371 27	
Deduct, Interest on Bonds and Floating Debt, Interest and Dividends on Guaranteed Securities and other charges amounting to		862,189 39
Net Earnings from Operation.....		$861,948 51
Add Other Income.....		1,500 00
		$863,448 51

There were set aside out of Earnings the following sums:		
For Royalty on Ore and Coal removed from fee lands	$359,234 04	
For additions to Reserve and Insurance Funds	151,094 18	
Making a total thus set aside of		510,328 22
		$353,120 29
There was written off from the valuation of Inventory Accounts for depreciation		89,447 00
		$263,673 29
Dividends on the Preferred Stock of the Company, amounting to eight per cent were paid		19,864 00
Leaving a balance of		$243,809 29

which sum was used to reduce the valuation of Plant Account.

Condensed Balance Sheet.

RESOURCES.

Land	$26,245,875 56	
Plant Account	8,012,800 12	
Investments	392,470 72	
Treasury Securities	8,000 00	
Cash, Bills and Accounts Receivable	2,181,993 01	
Inventory Accounts	1,385,603 66	
Total Resources		$38,226,743 07

LIABILITIES.

Capital Stock:		
Common, T. C. I. & R. R. Co.	$22,552,800 00	
Preferred, T. C. I. & R. R. Co.	248,300 00	
Guaranteed, A. S. & S. B. Co. Preferred	440,000 00	
Bonds (less Sinking Funds)	13,285,035 94	
Current Liabilities	1,469,158 64	
Reserve and Provisional Funds	231,448 49	
Total Liabilities		$38,226,743 07
During the year 1901:		
Quick Convertible Assets have increased		374,668 98
Current Liabilities have decreased		2,653,003 99
Inventory Accounts have been reduced		386,912 49
There was expended during the year for New Construction:		
At Ensley Steel Works		$636,404 92
At Pratt Mines		46,370 16
At Bessemer Rolling Mill		12,670 79
At other Plants		64,207 84
Total		$759,653 71

Production and Shipments.

COAL:		
Total Product	4,085,086	Tons
Shipments to Market	1,672,814	"
Converted into Coke	1,969,005	"
Consumed in Operations	441,875	"
COKE:		
Total Product	1,179,855	Tons
Shipments to Market	22,899	"
Shipments to Departments	1,155,904	"
IRON ORE:		
Red Ore	1,113,362	Tons
Brown Ore	302,361	"
Total Product	1,415,723	Tons
Shipments to Departments	1,415,723	"
LIMESTONE:		
Total Product	220,569	Tons
Shipments to Market	820	"
Shipments to Departments	218,805	"
PIG IRON AND FERRO-MANGANESE:		
Total Product	628,268	Tons
Shipments to Market	572,435	"
Shipments to Departments	102,580	"
OPEN-HEARTH STEEL INGOTS:		
Total Product	109,805	Tons
Shipments to Departments	108,260	"
OPEN-HEARTH STEEL BILLETS, BLOOMS AND SLABS:		
Total Product	94,566	Tons
Shipments to Market	81,205	"
Shipments to Departments	13,905	"
IRON AND STEEL BARS, PLATES AND SHEETS:		
Total Product	23,026	Tons
Shipments to Market	20,475	"
Shipments to Departments	3,024	"

SUMMARY OF MARKET SALES.

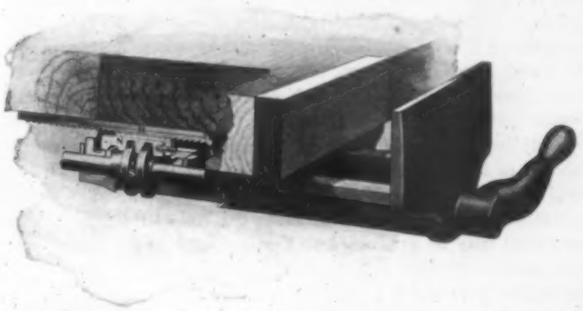
Pig Iron and Ferro-Manganese	572,435	Tons
Coal	1,672,814	"
Steel Billets, Blooms and Slabs	81,205	"
Iron and Steel Bars, Plates and Sheets	20,475	"
Coke	22,899	"
Limestone	820	"
	2,370,648	Tons

L. T. BEECHER, Secretary and Treasurer.

A QUICK-ACTING VISE.

Wyman & Gordon, of Worcester, Mass., were among the first to use the quick-acting principle in vises and have placed a large quantity of this type in shops of every description. The illustration shows the idea as embodied in a pattern-maker's vise and this design has found favor in a large percentage of the best manual training schools as well as in pattern shops generally.

The principle of the vise depends upon a long rack of V-shaped teeth in which meshes the teeth on the back of a split nut which is engaged by a screw thread on the shaft of the vise. When the vise is open the nut is disengaged from the rack and the jaw can be freely moved back and forth. A quarter turn of the handle pulls the nut forward and upward by means of inclined planes and clamps the jaw firmly on the work between them. On reference to the half-tone it will be



THE WYMAN & GORDON QUICK-ACTING VISE FOR PATTERN MAKERS.

seen that the vise can be operated by the one hand when the handle is held upright. The sliding jaw with the handle in a vertical position is brought up to the work when with a quarter turn of the shaft carrying the screw S, the nut N is forced upward and forward on the inclined planes I, engaging with the rack R, which is attached to the fixed bench piece, and further turning of the handle draws in the jaw by means of the screw S working in the nut N. This last motion gripping the work firmly between the jaws of the vise.

These tools are neatly finished in three sizes, known by the width of the jaws, 6, 9 and 14 inches, the first two sizes opening to a distance equal to the width of the jaws, and the latter to 12 inches. The parts are all machined by the aid of special tools and jigs and are so few and simple that the vise is practically immune to the severity of high pressure shop usefulness and will last indefinitely.

The Durham Furnace, at Riegelsville, Pa., was put in blast the middle of last month by the Durham Co. The repair work, filling and blowing in, were done under the direction of Jerome Keeley, Jr., superintendent, formerly with the Poughkeepsie Iron Co. The furnace was charged to blow in on high silicon foundry iron and the first cast ran 4.66 per cent. Those following gradually decreased in silicon as the burden was increased until the desired amount, 2.25 to 2.75 per cent, was obtained, grading up the No. 1 and No. 2 X, on which the furnace is now running.

A contract for 35 miles of 10-inch pipe has been awarded by the Central Ohio Natural Gas & Fuel Co., of Columbus, O., to the Eastern Tube Co., of Pittsburg.

FEEDING DEVICE FOR SCREW-CUTTING LATHES.

A feeding device for screw-cutting lathes has been designed by John Grime, 1709 7th St. South, Minneapolis, Minn. The purpose of the invention is to introduce a method for the production of threads without the aid of a lead screw and without change of gears. The object is obtained by substituting in place of the usual mechanism for moving the lathe carriage and feeding the slide rest, a horizontally adjustable guide-bar on a carriage that is arranged to move across the lathe. This guide-bar having slide connections with the tool-rest so that the movement of the former serves to regulate the feed and determines the pitch of the screw.

Fig. 1 shows a lathe equipped with the device and Fig. 2 is a detailed drawing showing the use of the guide-bar already mentioned. On the end of the main spindle in Fig. 1 is a pinion which forms part of a train of gearing having a shaft B

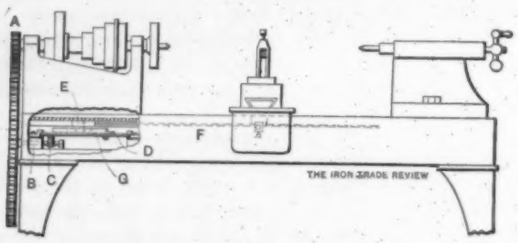


FIG. 1.—A SCREW-CUTTING DEVICE.

passing through a suitable support and operating a small pinion at C. The pinion C meshes in a rack attached to the plate D, and to the latter is pivoted a guide-bar G having a slot containing a sliding block E. The sliding block E is attached to a rod F, which, in turn, is locked to the lathe carriage. It may here be said that in both of the illustrations the same letters are employed to designate identical parts. It will readily be seen that with the guide-bar G locked in the position shown in Fig. 2 that the movement to and fro of the plate D will give a corresponding motion to the rod F, and consequently the carriage will slide along the bed of the lathe. The quadrant may be graduated so that the bar can be set at once for various pitches, and as this operation simply means the adjustment of one bolt and the one lever, this change is evidently very conveniently obtained. The device is restricted for

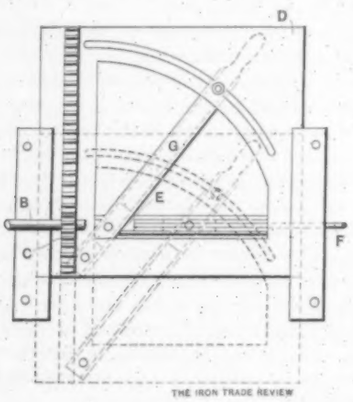


FIG. 2.—DETAIL OF SCREW-CUTTING DEVICE.

obvious reasons to the cutting of short screws but the changes to the various pitches can be made so readily by either the use of a bolt or the dropping of a latch or pin that within the limitations of the machine the device affords opportunities for very rapid work. Fractional pitches are easily cut by placing the lever between the ordinary standard spaces so that metric or any other ratio may be readily obtained without a translating gear.

The device is essentially a reciprocating triangle with a variable hypothenuse. The base of the triangle is necessarily the maximum length of screw that can be cut. Thus, a triangle with a 12-inch base would cut a thread 12 inches in length, and of course the finer pitches with that arrangement would necessitate other screws being somewhat shorter, but by slowing the speed of the plate D with a change in gearing and a longer guide-bar G, longer threads up to about twelve inches could be cut. The device can be attached to either end of lathe or at the back of the bed as well as in the position shown in the engravings.

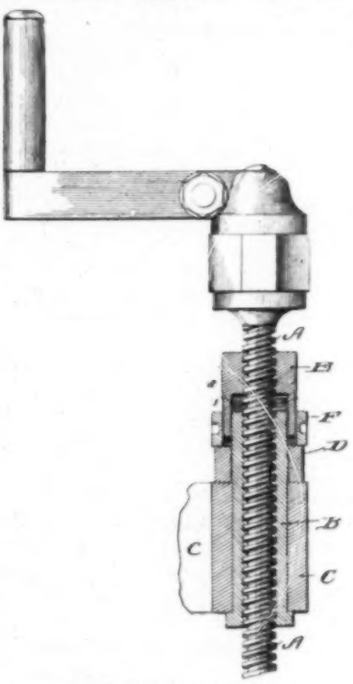
The inventor proposes that the device shall in practice be operated with a clutch so as to be capable of being dropped back against a stop and cushion after the tool has finished a cut; this would insure more rapid work and also guarantee the correct starting of the thread.

It will be seen on examination of the device that the guide-bar G need not be straight but may be curved to obtain increasing pitches, should these be desired for any purpose, and in addition to this advantage the plain form of the guide-bar is, for regular pitches, capable of being easily maintained in good condition.

The sliding block E may be lengthened to insure good wearing surface and within the obvious limitations of the device it is certainly capable of doing very interesting work. For example, it is ordinarily advisable to cut a tap a certain distance longer in pitch in order that, after the consequent shortening when hardened, the correct pitch may be obtained, and in the case of cutting taps for dies where two contractions must be compensated in some manner, such a device as the one described may be found very convenient in making the necessary variation from the standard pitches.

A METHOD OF FEED-SCREW ADJUSTMENT.

A feed screw adjustment has been recently patented by John Doney, of Pen Argyle, Pa., which has the object of providing "an exceedingly cheap and simple adjusting means capable of use in connection with a feed screw." Referring to the engraving, A indicates the feed screw passing through a feed nut B, which rests within a collar or bracket C. The feed nut B extends a considerable distance above the part C and has a thread cut on the projecting portion to fit a check nut D, the



A FEED-SCREW ADJUSTMENT.

latter holding the main nut B securely in the hole bored through C. An adjusting nut E fits on the feed screw above the upper end of the main nut B and is threaded inside and out to fit the check nut F and the feed screw nut B.

The adjusting nut E is for the purpose of taking up the wear of the screw A when it is necessary to make this adjustment, the nut F is loosened and the nut E turned the requisite amount to take up the backlash and the nut F can then be retightened and all the parts will be held in their relative positions. The parts when so locked forming a complete nut and by this means of taking up the backlash the use of the feed screw can be continued for a greater length of time.

PITTSBURG ENGINEERS ON THE METRIC SYSTEM.

At a special meeting of the Engineers' Society of Western Pennsylvania held at Pittsburg on Tuesday, April 29, the following resolutions regarding the adoption of the metric system as a legal standard in the United States were adopted;

WHEREAS, An international standard of weights and measures is desirable, and

WHEREAS, The present system of weights and measures in use in this country is extremely complex in its interrelations, unsuited to future engineering and commercial development, and one for which there can be no hope of international adoption, and,

WHEREAS, The metric system, as developed by the International Bureau of Weights and Measures is the best system of weights and measures known, exceedingly simple in its interrelations, greatly simplifying the work of enumeration and computation, and well adapted to all engineering and commercial work, and

WHEREAS, The metric system has been adopted by all except two of the civilized nations of the world; therefore, be it

Resolved, That the Engineers' Society of Western Pennsylvania approves of any movement which will help to bring about a universal adoption of the metric system with reasonable economy of transition; and be it further

Resolved, That the United States Congress should enact such laws as will lead to the early adoption of the metric system as the standard of weights and measures in the various departments of the National Government.

The Owen Machine Tool Co., Springfield, O., has secured a temporary location in the plant of the Whitely Mfg. Co., and has equipped the second floor with new machinery.

The land, buildings, machinery, patents, contracts, etc., of the Simonds Rolling Machine Co., Fitchburg, Mass., were sold at public auction last week to R. E. Forbes, of Boston, who represented the bondholders for $55,000. It is probable that the plant will be operated by the bondholders, although this has not been definitely decided upon as yet.

No. 2 furnace of the Sloss-Sheffield Steel & Iron Co., Birmingham, Ala., will be placed in operation about the middle of June. The work of rebuilding the furnace has been completed, but owing to the non-arrival of a pair of blowing engines resumption of operations has been retarded.

THE SAGE ROTARY ENGINE.

The Fraser Machine Co., Frankfort St., Cleveland, has recently completed an engine of an unusual type. It is illustrated in the accompanying engravings and will be at once assigned by the reader to the rotary family of steam motors. The engine is capable of rotating the circular case shown in the complete form in Fig. 1; or with a slight change this part may be held and the crankshaft can be provided with a pulley and power obtained by means of a belt therefrom in the ordinary way. The general view of the assembled machine in Fig. 1 shows a drum mounted on two bearings forming part of a plain cast iron bed. Two steam pipes at the right and left of the main bearings admit the live steam on the one hand and release the exhaust on the other. On the right of Fig. 1 is a reversing lever and quadrant which may be employed for changing the amount of lead and cut-off as well as providing a means for rotation in either direction. Suitable stuffing boxes are provided on the hollow shafts and at the connection of the steam inlet pipe.

The engine has had the outer cover removed in Fig. 2 and the two halves have been separated to show the four pistons and the crankshaft connections on the one part and the inlet connections on the part of the machine seen in place on the bed to the left of Fig. 2. The general arrangement of the details will be the best seen, however, by Fig. 3, which gives a vertical section through the axes of two opposite cylinders and along the axis of the main shaft and trunnions. The exterior of the engine AA is here represented as in one piece and one or two other liberties have been taken with the actual construction of the machine in order that no unnecessary complication might introduce any difficulty in an explanation of the working features. The shafts B and B1 have easy running fits in the casing AA and in turn ar bored out for steam and exhaust purposes. The stuffing boxes and glands are not shown in this view as they are clearly seen in Fig. 1. Each of the four cylinders is provided with a trunk piston, as at C and D, and the connecting rods are attached to a fixed eccentric pin fastened to the crankshaft H in the usual way.

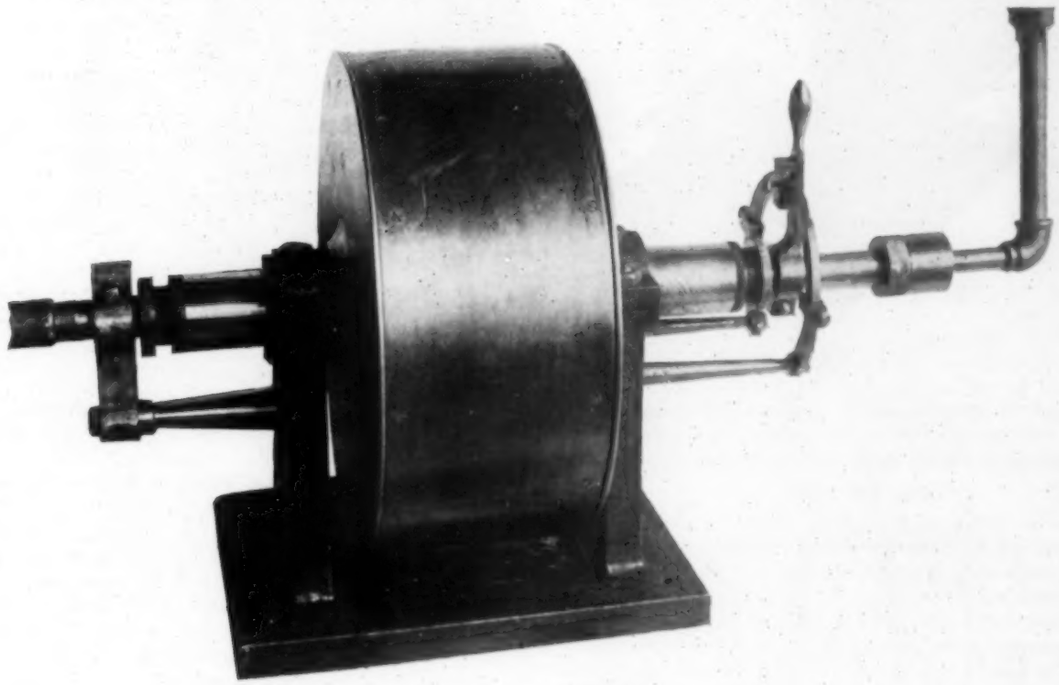
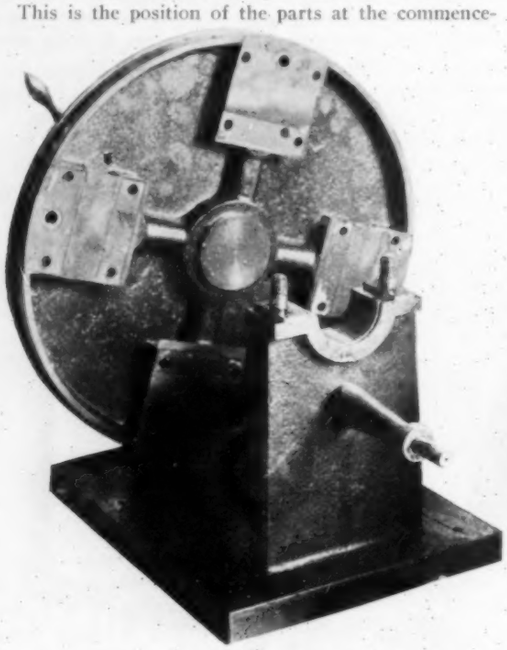


FIG. 1.—THE SAGE ROTARY ENGINE.

When steam is admitted to the opening through B it passes, by means of the hole drilled at right angles to the bore, up and on to the piston D, pressing down the piston and thereby rotating the casing AA. As the piston D moves along its cylinder it gradually comes into a position where the turning of AA will close the inlet from B and the remainder of the stroke will utilize the expansive power of the steam retained in the clearance space behind the piston, etc.

The exhaust valve is operated on a differential method which is so employed that the centrifugal force of the rotating parts can have no detrimental effect upon the elements which are provided for the purpose of maintaining the port openings during the required intervals. This device is indicated by the letters E, F and G, at the upper part of Fig. 3. When the incoming steam acts upon the upper side of the piston D, pressure is brought to bear against the valve E which is tightly closed and through the medium of the lever F the valve G is pressed in the other direction to the position shown in the engraving. This is the position of the parts at the commencement of the stroke and this condition continues until nearly the end of the working movement of the piston. Another position of the apparatus is shown by the piston C where the inward



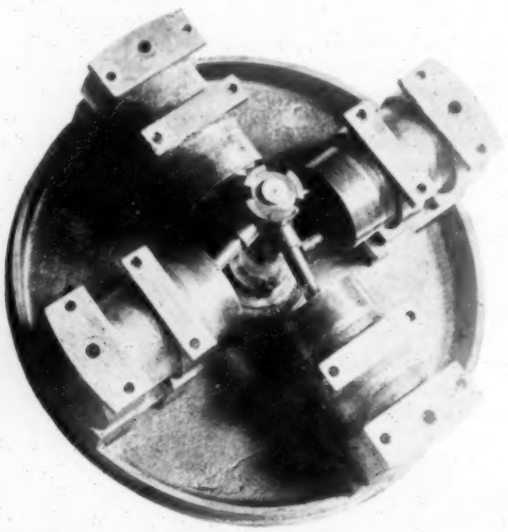


FIG. 2.—ROTARY ENGINE WITH COVER REMOVED AND THE TWO HALVES SEPARATED.

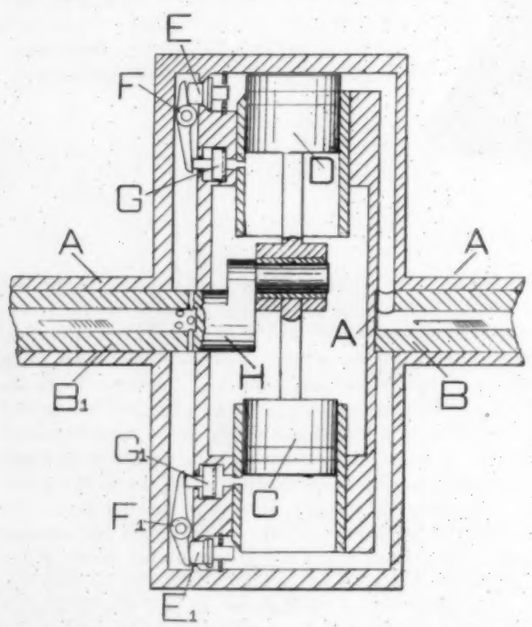


FIG. 3.—GENERAL ARRANGEMENT OF ROTARY ENGINE DETAILS.

movement of the piston has uncovered the port leading to the supplementary piston G1 which is driven to the left, and by means of the lever F1 the valve E1 is opened and exhaust is taking place. This action takes place immediately on uncovering the edge of the port leading to the supplementary piston G1 and the difference in the areas of G1 and E1 as well as the variation in the lengths of the two arms of the lever F1 ensures a quick opening of the valve. As the casing AA continues to rotate and the piston C moves back covering the port leading to G1 a certain amount of steam is trapped between the surface of the piston and the back of the supplementary piston G1, and this pressure is held for a short time while that in the main cylinder rapidly diminishes as the exhaust steam finds its way freely to the atmosphere. When the piston attains the extent of its outward movement as indicated by the position of the piston D, the back of the supplementary piston G is opened to the interior of the casing AA and the live steam is entirely free to move the parts E, F and G, which have then nothing but their sliding friction resisting the pressure. The back of the supplementary pistons G and G1 are recessed to permit the access of the steam over a large area at the instant of application and prevent any sticking of the parts.

It will thus be seen that the valves, supplementary pistons and the levers, constitute a differential mechanism which is operated solely by the pressure within the cylinder. In addition there is no requirement of a slide valve or equivalent means operated by the main pistons for permitting the exhaust to take place, and there is no need of springs or other auxiliary means for holding the valve in either its closed or open position, this being accomplished by the formation of the cushion (fluid) for the supplementary pistons, G and G1, which prevent the valves E and E1 closing, the pressure within the cylinders normally holding these valves closed. The engine as built has a chamber or recess around the hollow crankshaft B1 where the drilled holes communicate with the exhaust passages. This could be arranged, however, similarly to the method illustrated on the steam side in the shaft B, the recess or chamber permitting an outlet to the several cylinders simultaneously.

This engine is the invention of the late George F. Sage, of Cleveland. On account of the facility with which the power may be taken from the circumference of the casing by a belt or any other suitable means, the reciprocating parts, cylinders, disks, etc., forming to some extent a substitute for the flywheel, or belt pulley, the machine is suitable for purposes where a small and compact unit may be required.

The wire mill of the Dillon-Griswold Wire Co., Sterling, Ill., will resume this week on the arrival of the first shipment from Pittsburg on a new contract for wire rods. The rod mill at Sterling will resume, the management says, as soon as the difference between the prices of billets and rods will permit of a profit.

John Hanchett, senior member of the firm of J. Hanchett & Bro., iron founders, Big Rapids, Mich., has retired from active business. His interests have been sold to Volney Hanchett.

AMALGAMATED SCALE CHANGES PROPOSED.

The convention of the Amalgamated Association of Iron, Steel and Tin Workers of America adjourned at Wheeling, W. Va., on Friday, May 2. President T. J. Shaffer and the other executive officers were re-elected and the following new vice presidents were chosen: Second district, Llewellyn Lewis, Martin's Ferry; Third, W. E. Egan, Covington, Ky.; Fifth, P. J. McArdle, Terre Haute; Seventh, William Jenkins, Gate City, Ala.

While the convention indorsed the wage scale agreements with the American Tin Plate, American Sheet Steel, Republic Iron & Steel and American Steel Hoop Companies, the following suggestions for changes in the memoranda and foot notes were made and will be immediately taken up with the manufacturers:

The second clause in the memorandum of agreement was amended by providing that on mills working iron or steel weighing 130 pounds or over the company shall furnish extra help to the heater. The weight in the present clause is 160 pounds. The following clause is desired for the memorandum of agreement:

"5. Finishing mills will be allowed to work three turns when practicable. On finishing mills working or desiring to work three turns, eight hours shall constitute a day's work. Rolling shall not start earlier than 5 o'clock a. m. Monday morning, and first furnace shall cease charging at 11:30 a. m. on Saturday. The last furnace shall not charge later than one hour after the first furnace and close the week's work. On all mills working three turns a third roller shall be employed."

The sixth clause was changed to read: "Resolved, That on all 10-inch guide and hoop mills with one furnace averaging 3,500 pounds per turn, or with two furnaces, 6,500 pounds per turn on a 9¼-hour system, based on a 1-cent card, the 8-hour system be adopted. That on bar and 12-inch mills averaging 85,000 pounds per turn on two furnaces, or 60,000 pounds on one furnace on the 9¼-hour system, the 8-hour system be adopted."

Boilers' Scale.

Amendments desired: Foot note 24 changed to read: "That puddlers and scrappers shall lose only the amount over the limit of a ball."

The following to be added to foot note 25: "And when heats must be thrown out the company shall bloom same if possible."

New clauses desired for boilers' scale:

"26. That where pipe is worked in cinder bottom furnaces, mixed with light scrap, it shall be cut three inches long for charging."

"27. That on all puddle mills where they run a buggy, the company shall hire a man to run same."

"28. When working one-third wrought iron turnings, or one-third light scrap with two-thirds swarth on cinder bottom furnaces, the limit shall be 4,200 pounds."

"29. When swarth and scrap is worked on cinder bottom, and swarth is wheeled in and dumped in a pile, and scrap is wheeled in one ball at a time, scrap weighing 80 pounds or less, that the price for working such mixture shall be seven-eighths (⅞) the price of boiling."

"30. That where hot cylinder clay or ganister, fix, or any other substitute for pulverized ore is used, the price shall be 50 cents per ton extra, except hot ore fix, which shall be $1.00 per ton extra."

"31. That in all mills where screenings are given to puddlers when working several, the full boiling price be paid, and that such screenings cannot be classed as mixed material."

Muck or Puddle Mill Scale.

Recommended that the words "or hot scales" be inserted after the word "bank" in the fifth line. It was decided that foot note 5 be amended by making it read:

"On mills averaging 16 tons or less per turn in two weeks, the company shall pay the drag-outs."

In the section referring to "piles on boards" the following new paragraph was added:

"That all piles on board furnaces where average output is 24,000 pounds or over, shall work three turns where the puddle mill works three turns."

The following additions are suggested under "Busheling on Sand Bottom:"

"6. Two bundles shall be the limit of each ball."

"7. That when light scrap is worked without turnings, 20 cents extra above light scrap price shall be paid."

"8. That when heavy scrap is worked alone on sand bottom, without turnings, the price to be 20 cents above the price paid for busheling."

"9. That when a scrap bloom goes through first pass in the rolls the scrapper to be paid for the same."

Bar and 12-Inch Scale.

"7. The words 'all except' on straight two-high bar mill are added to foot note 7 of bar mill scale."

"8. To strike out the words 'excessive to' in the third line of foot note 8 and the following after the word 'paid' in the last line of said foot note—'and where the same are subsequently rolled into other sizes, thereby taking the place of billets, and when they are used for plates off a solid or other piles, 10 per cent more than scale price shall be paid.'"

New clauses:

"12. Company shall pay firemen on all heating furnaces.'

"13. That night turn roller shall receive not less than one-half the straight price for rolling."

"14. That where a mixed heat of iron and steel is worked in heating furnace that the price of iron shall be paid."

"15. That company furnish heater a competent man to help turn iron in furnace on piles weighing 300 pounds or over."

"16. That the company furnish two strainers on guide rounds when worked on a bar mill."

Guide, 10-Inch, Hoop and Cotton Tie Scale.

Substitute for foot note 13: "Wages of all hands working on guide, 10-inch, hoop and cotton tie mills not provided for in scale shall rise and decline with card rate."

New clauses:

"14. When working non-uniform billets, such as cuttings, cobbles and scrap yard billets, 21 cents for rolling, 10½ cents for heating and 5¼ cents for roughing and catching each, shall be added to the straight price per ton for working piles."

"15. That the price for three-quarter No. 18 star iron be as follows: Roller, $3.53; heater, $1.76½; rougher and catcher, each, 96 cents per ton.

"16. Company shall pay fireman on all heating furnaces.'

Sheet Mill Scale.

Substitute for foot note 4: "All sheet iron or sheet steel shall be weighed by the company after being sheared and opened, and the company shall furnish the complete weight of each turn to the roller, or put the same in a convenient place."

In the "sheet mill hands' scale" it is proposed to add to foot note 11, these words: "This to apply only to sheets 60 inches long and shorter lengths." The above change to be incorporated also in the roughers' and catchers' scale.

Tin Mill Scale.

"1. That the screw boys do not bundle any scrap ends, scrap to be bundled by the company."

"2. That all tin mills be paid at least every two weeks."

"3. That as a counter proposition to the three-year scale we propose to agree on condition that we get the Cleveland 1900-01 scale and foot notes, with the same conditions as then prevailed, where now practicable."

"4. And when in the judgment of the manager and the mill committee the work is too heavy for the catcher, extra help shall be furnished."

"5. That when dirty bars are supplied for tin mills the company shall furnish a man to sweep them, and that the crew shall not be held responsible for dirty iron. The crew shall be paid for production per mill for such iron put in by the company."

"6. That no more level hand jobs be given in tin mills, and level hand men be singled out as soon as a vacancy occurs."

"7. That 10 per cent extra shall be paid for 40 gauge when doubled three times."

Under "Morewood Stacks" the following is added:

"2. That the drag-down from furnace to rolls on sheet bar mill have a scale of about 14 cents per ton."

Sheet and Tin Bar Scale.

New foot note:

"That the price paid for drag-down on sheet bar mill be one-third the price of heater's price."

The special scales were referred to the various district boards for settlement.

NOTES ON BLAST FURNACES.

BY JOHN M. HARTMAN.

The first all-iron stack for blast furnaces was designed by Mr. Elliott, of Philadelphia, built by I. P. Morris & Co., of the same place and erected by them in 1854 for the Bay State Iron Co., Port Henry, N. Y., as shown in Fig. 1. G. G. Palmer was superintendent for the company. Mr. Elliott used two rows of columns, the inner row to support the lining and the outer row to support the shell and back courses. It was an open-top furnace and gas was collected by a ring flue having slots through the lining to draw off the gas. The old style tymp and fore hearth with coil tuyeres were used. After 40 years of work the furnace was dismantled.

In 1860 John Fritz built No. 1 Furnace for Bethlehem Iron Co., Bethlehem, Pa. He dispensed with the inner row of columns, erected much heavier columns and placed on them a heavy cast-iron mantel, well bound, then started the lining direct from the mantel, using an offset in the lining to build the bosh wall up again and under as per Fig. 2. This arrangement is used today in all furnaces, having proved a success from the first.

In 1871 Andrew Kloman erected the Lucy Furnace, at Pittsburg, using circular wrought beams to support the mantel, which gave a flexibility to the support and avoided cracked mantels that occurred at other places. In 1878 Taws & Hartman introduced high columns with the Kloman mantel at Bessemer, Pa., for the Edgar Thomson Steel Co. This placed the mantel above the top of the bosh as shown in Fig. 4, and prevented the inwalls from burning back over the top of the mantel, which leaves a hump for the stock to lodge on. Care must be taken to use the proper volume of air and not let the fusion zone come below the mantel to form a ring scaffold below the mantel. The thin walls lose their heat quick and allow the stock to paste fast to the walls when the furnace stands.

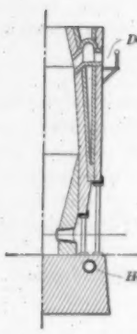


FIG. 1.—BAY STATE IRON CO. FURNACE, 1854.

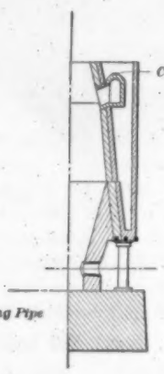


FIG. 2.—BETHLEHEM IRON CO. FURNACE, 1861.

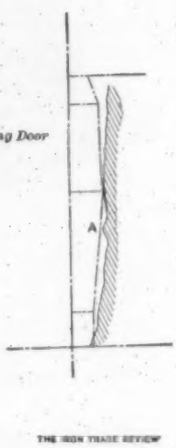


FIG. 3.—COLEBROOK FURNACE, 1885.

In 1885 Taws & Hartman at Andover Furnace No. 1, Phillipsburg, N. J., dispensed with all the back courses of brick work above the mantel using one 30-inch brick and 2 inches of mineral wool next to the shell as per Fig. 5. This furnace ran a long blast and worked well. The shell did not burst. Subsequently another party put in a lining old style without the mineral wool and burst the shell badly.

Various forms of backing have been tried, such as sand, loam, granulated slag, crushed brick, etc., but none have been found reliable. Mineral wool of good quality is the best, as it gives way for expansion. If a crack occurs in the inwalls from expansion, letting the gas pass through to the mineral wool, the dust in the gas is caught by the wool and soon stops all passage of the gas. The wool can be used over when the lining is to be renewed. To allow for expansion the furnaces built about 1867 had 5 feet 6 inches of inwall and backings, but this did not prevent the shell bursting. Thick linings are useless except at the zone of fusion where the heat in the walls must be maintained to prevent the semi-fused material from chilling on the walls by the too rapid conduction of heat on the outside.

A special grade of brick is required here. It is a matter for brickmakers to inquire into. At Colebrook on one occasion when the furnace was blown out the lining was found in the shape shown in Fig. 3. The furnace had been run for some time with a moderate volume of blast, the zone of fusion was at A. The brick work was highly glazed at that joint. The brick back of A were intact, yet they were cut away above and below it. The furnace after a period of moderate volume of blast was blown with a larger volume which melted away the brick above and below A, yet the glazed brick at that point withstood the intense heat.

A lining of one 30-inch brick is much better than one of 20x10-inch laid breaking joints. When the 10-inch block has melted or worn away about 7 inches the balance soon becomes loose and falls out. This leaves a cavity for the gas to work in and destroys that much of the brick above which loosens the piece above, letting it fall out. The surface of the lining then becomes a series of holes, rough and irregular, giving an irregular descent of the stock.

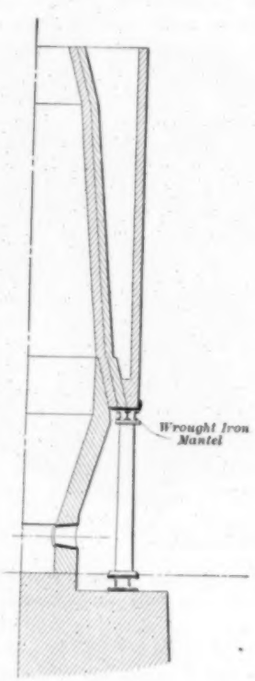


FIG. 4.—EDGAR THOMSON FURNACE, 1878.

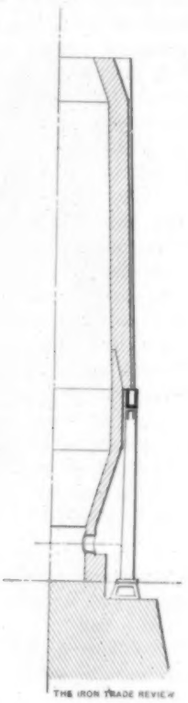


FIG. 5.—ANDOVER FURNACE, 1885.

Work on the new furnace plant of the Pioneer Iron Co., at Presque Isle, Mich., is progressing rapidly. The charcoal kilns are well along and will be completed about July 1. The furnace stack proper is about half completed and the installation of the boilers has already been commenced. The Wm. B. Pollock Co., of Youngstown, O., is erecting the buildings and stack and hot blast stoves. F. C. Roberts & Co., of Philadelphia, are the engineers.

Work will be commenced immediately on the erection of the new plant of the Malleable Iron & Chain Co., at West Allis, Wis. The plant and equipment will cost about $60,000. Operations are to commence about Oct. 1.

B. Crawford has sold his interest in the Sterling Foundry at Sterling, Ill., and has become associated with Edward Cochran, the firm name being Cochran & Randall.

The new plant of the Norwalk Steel & Iron Co., Norwalk, O., will be completed about Sept. 1. The erection of the buildings is progressing rapidly. The boiler and gas producer plants will be completed this month. The main building will be erected by July 1.

PERSONAL.

Charles Ranlet, general manager of the Worcester, Mass., plant of the American Steel & Wire Co., and J. O. E. Trotz, superintendent of the South Works of the company at Quinsigamond, Mass., have resigned and will embark in the wire business for themselves. Harry G. Stoddard has been appointed Mr. Ranlet's successor and E. J. Watson will succeed Mr. Trotz. George A. Cragin will succeed Mr. Stoddard as sales agent of the Washburn & Moen department of the American Steel & Wire Co., and J. D. Crosby will succeed Mr. Watson at the North Works.

J. C. Maben, recently elected president of the Sloss-Sheffield Steel & Iron Co., Birmingham, Ala., accompanied by Directors W. H. Goadby and Col. H. O. Seixas, last week made a tour of inspection of the furnaces in the Birmingham district.

T. C. Jones, who has been superintendent of the Allegheny Iron Co., of Iron Gate, Va., for nearly 12 years, has removed to Richmond, Va., to manage the business of F. C. Dininny, Jr., who was president of the company.

Andrew Carnegie, accompanied by his family, sailed for Europe on Wednesday, April 30.

John M. Franklin has been appointed manager of the mining operations of the Tennessee Coal, Iron & Railroad Co., with headquarters at Birmingham, Ala. He was formerly assistant manager of the Rainey Coal & Coke Co., Connellsville, Pa.

Thomas Parrock, general superintendent of the mills of the Republic Iron & Steel Co., at Youngstown, O., has made the following appointments and changes: George Summers, of the Brown-Bonnell plant, promoted to superintendent of the Valley mill plant, vice George Lowe, resigned, to take charge of mills at Muskegon; Harry Parrock appointed superintendent of the Brown-Bonnell plant. The latter has been in charge for 11 years of the Youngstown mills, now operated by the American Steel Hoop Co. His successor has not been announced. George Puggins, who has been connected with the Brown-Bonnell plant for ten years, has been appointed assistant superintendent.

George G. McMurtry, president of the American Sheet Steel Co., has purchased a home in New York City.

Gentry Hillman, who has resigned his position as manager of the city furnaces of the Sloss-Sheffield Steel & Iron Co., Birmingham, Ala., has accepted a position with the Tutwiler Coal & Coke Co., and will have charge of remodeling their plants.

W. M. Dillon, president and manager of the Dillon-Griswold Wire Co., Sterling, Ill., has resigned and has been succeeded by C. M. Wicker, of New York City, who represents the majority stockholders in the company. Mr. Dillon, however, continues to hold his stock. Col. Moses Dillon resigned as a director and was succeeded by Chester Griswold, recently elected treasurer. Robert McCosh was elected assistant treasurer.

Veryl Preston, formerly president of the American Steel Hoop Co., has been elected third vice president of the United States Steel Corporation, with headquarters at New York.

Archer Brown, of the firm of Rogers, Brown & Co., New York, has been succeeded on the board of directors of the Sloss-Sheffield Steel & Iron Co. by H. O. Seixas, of New York. There has been no selection to fill the vacancy on the board caused by the resignation of E. O. Hopkins.

George G. Foregot has resigned as master mechanic of the Bay View mills of the Illinois Steel Co., to accept the superintendency of the Scranton, Pa., plant of the Allis-Chalmers Co.

A. P. Tucker, of the Tucker Machine Co., Cincinnati, who has been ill for some time, is able to be at his place of business again.

The statement is made, apparently on authority, that Andrew Carnegie's public donations to date amount to over $67,000,000.

A GERMAN PRESSED STEEL PULLEY.

The old style of cast iron pulley is finding increasing competition from the pulleys manufactured of wood or sheet steel. The rough usage often given to pulleys was too frequently destructive of the cast iron and in practice the light wood or sheet metal pulleys have been very successful, particularly so in the smaller sizes. The expense attendant upon the manufacture of the sheet steel pulleys has been one of their objectionable features and a number of attempts have been made to find a cheaper method of production. One of these is the patent of the Dusseldorfer Rohrenindustrie and is illustrated in the accompanying engravings. These pulleys have no rivets and they are exceedingly light; on this account they are well adapted for high speeds as the weight is uniformly distributed and belting is not so liable to be injured as might be the case with spokes riveted to the rim. This, however, is a matter of finish rather than design.

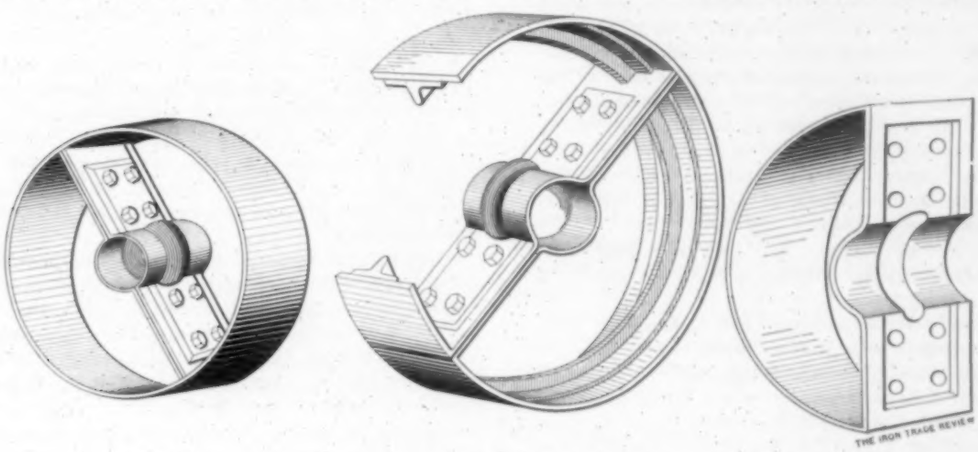


FIG. 1. FIG. 2. FIG. 3.

A NEW PRESSED STEEL PULLEY.

Fig. 1 shows the pulley complete, consisting of two halves only. One of these halves is to be seen at Fig. 3 and this part, comprising the rim, cross piece and hub, is pressed out of a single section of steel tubing. The hub and cross piece in Fig. 3 are strengthened by means of ridges and indentations pressed up in the metal surface during the process of manufacture. The hollow pressed into the cross piece serves as a stiffening strip for the retaining bolts which are best shown in Fig. 1 where the two halves of the pulley are bolted together. When the size of the pulleys is increased, say from 18 to 30 inches, the unsupported rim between the ends of the cross pieces is apt to buckle to some extent. This tendency to weakness is counteracted by a T-iron stiffener introduced cold during the process of pressing up the pulley. The pulley is then at a red heat and the T-iron rib is securely held as the rim and cross piece contract in cooling.

The description goes on to say that the surface of the pulley is turned smooth and it may be that the crowning of the pulley is accomplished in the same manner. Should the pulley be actually finished in this way it would seem that there is considerable waste of material and time as compared with the fine die work and grinding methods adopted for that class of work in this country. However this may be, the invention is certainly a very interesting example of another attempt at a solution of the pulley problem and incidentally it suggests a few press problems.

INDUSTRIAL SUMMARY.

[If you are in need of machinery of any description, please notify *The Iron Trade Review*, and we will put you in communication with our advertisers at once.]

New Buyers in the Market and Some of their Wants:—

The Hollidaysburg & Gap Iron Works, Hollidaysburg, Pa., have been purchased by Robert C. Neal and associates, of Harrisburg, Pa. The new management will rebuild and prepare the plant for operation immediately.

The Belleville Foundry Co., of Belleville, Ill., has been incorporated with $15,000 capital. W. H. Wangelin, I. H. Wangelin and R. W. Roniquet are the incorporators.

The Brower-Warner Co., of Chicago, has been incorporated with $28,000 capital to manufacture machinery. N. H. Hacker, M. J. O'Kelly and George E. Ruther are the incorporators.

The Boyertown Ore Co., recently incorporated with $300,000 capital, of Boyertown, Pa., has purchased the entire group of ore producing mines formerly owned by Gabel, Jones & Gabel, the Phoenix Iron Co., the Lewis Estate and the Warwick and Binder properties, covering in all 256 acres, with all the machinery, buildings and dwellings. The officers of the company are William S. Harvey, 119 South Fourth St., Philadelphia, Pa., president; John Birkinbine, vice president; G. W. Lex, secretary; W. P. Wilson, treasurer; the above officers, together with David Reeves and Archer Brown, compose the board of directors.

The entire plant of the Lebanon Rolling Mill Co., Lebanon, Pa., was transferred last week to the Lebanon Iron & Steel Co. for a nominal consideration. The capital stock of the company is $175,000. The organization remains unchanged.

The Gunther Foundry, Machine & Supply Co., of San Antonio, Tex., has been incorporated with $50,000 capital. Harry Gunther, G. R. Robbins and R. W. Lewis are the incorporators.

The Superior Supply Co., of Bluefield, W. Va., has been incorporated with $100,000 capital to manufacture tipples, car wheels and coke oven supplies.

The Copake Iron Co., Copake, N. Y., has been incorporated with $50,000 capital. Arthur Gifford, I. N. Collier and W. A. Miles are the incorporators.

The Minnesota Steel & Machinery Co., Minneapolis, Minn., has been incorporated with $500,000 capital. This is a consolidation of the Twin City Iron Works and the Minnesota Malleable Iron Co. The incorporators are James L. Record, O. P. Briggs, Joseph Garbette, R. P. Gillette and A. C. Cobb.

The Rockford Tack & Nail Co., Rockford, Ill., has been incorporated with $50,000 capital for the purpose of operating a plant for the manufacture of tacks and wire nails.

The Gateway Steel Tank & Roofing Co., of LaCrosse, Wis., has been incorporated with $10,000 capital for the purpose of manufacturing steel tanks and boilers. Andrew and Joseph Oberst and William Schwalbe are the incorporators.

The Murray Iron Works Co., Burlington, Ia., is increasing its plant in three different directions, and is in the market for crane motors and machine tools, also one or two generators of about 75 k. w. capacity.

The Marinette Iron Works Mfg. Co., Marinette, Wis., has decided to remove its plant to Warren, Pa., where six acres of land in a choice location have been purchased. The dimensions of the main buildings to be erected are as follows: machine shop, 80x350; foundry, 80x250, and other buildings in proportion, such as blacksmith shop, pattern shop, pattern storage, etc. The buildings are to be of brick and steel construction, the different departments being equipped electrically, power to be supplied by the company's own gas engines, direct connected to generators. The plant will be equipped with modern appliances adapted to the class of work done by the company, which will give it three times the capacity it has in its present shops. The company has three orders for export, and is about four months behind in shipments. It has employment for about 20 more machinists, could they be procured.

The American Bolt & Machine Co. has been incorporated with a West Virginia charter, capital stock, $200,000, and will have offices at Ottawa, O. A. H. Poe, of Ottawa, is an incorporator.

J. W. Van Meter, a manufacturer of brass trimmings, and H. G. Hart, owner of Hart's Iron Foundry at Salem, N. J., have formed a company which has been incorporated with a capital stock of $100,000. The foundry is to be at once enlarged.

T. A. Crews, Walkertown, N. C., is in the market for a 65-foot steel tower and a 20,000-gallon steel tank.

W. J. Brewer Engineering Co., 817 Fourteenth St., N. W., Washington, D. C., wishes to correspond with firms making small steel rollers, iron, steel and malleable castings, drop forgings and die stampings from scale drawings.

Wm. T. Harding, Raleigh, N. C., is in the market for automatic screw machine for making square head cap screws of the following sizes: 5-16x1 inch, ¼x1¼ inches and ½x2 inches; also wants automatic molding machine for molding small smooth castings ready for use after tumbling, tumber and other necessary foundry equipment for turning out small castings, among which will probably be air compressor and cupola.

Richmond Foundry & Mfg. Co., Richmond, Va., has been incorporated with a capital stock of $5,000. President, Arthur Scrivenor; secretary and treasurer, J. Stewart Reynolds.

Wiltsie Mfg. Co., Chicago, has been incorporated with a capital stock of $50,000, to manufacture machinery. The incorporators are Cornelius J. Wiltsie, William E. Gardner and Walker J. Balis.

Columbia Supply Co., Columbia, S. C., has been incorporated with a capital stock of $10,000 to conduct a general machinery supply business. The incorporators are G. A. Guinard, Christopher Atkinson and others.

The Waverly Traction Co., Indianapolis, Ind., is in the market for a battery of boilers and engines to generate 1,000-h. p.

F. & J. Meyer, 238 Front St., New York, wants to purchase machinery for manufacturing wood screws, one inch and one and one-quarter inch, male and female.

Petersburg Iron Works Co., Petersburg, Va., wants prices on 60-light generator, 100 volts, new or second-hand.

Heywood Bros. & Dobbins Iron Works, Ltd., Jennings, La., is in the market for a 20-inch swing 12-foot bed lathe, and for several chucks.

Peacock's Iron Works, Selma, Ala., are in the market for an upright belt-power hammer for blacksmith shop, power bolt-heading machine, capacity one inch or larger, two-inch power bolt cutter or larger, without dies, new or second-hand.

H. G. Barr & Co., Worcester, Mass., builders of machinery, have moved into a larger building. New equipment is being installed, including a new hoist.

The pipe foundry of the Central Foundry Co., at Lansdale, Pa., which was closed last summer, is about to be acquired by a new company, which make heavy castings.

The Pittsburg Valve & Fittings Co. is a new corporation about to be organized by Pittsburg, Akron and Barberton men for the erection of a factory at Barberton, O., which, it is stated, will employ 1,200 people. O. C. Barber, president of the Diamond Match Co., is a principal promoter. A site of 75 acres has been purchased.

E. B. Garwood will move his machine shop from Blue Ridge to Canton, Ga.

T. F. Phillipi, M. B. Nolan and E. M. McDonnell have incorporated the Excelsior Tool & Machine Co., of East St. Louis, Mo. Capital stock, $75,000.

The Ohio Solid Steel Co. was incorporated in New Jersey last week with a capital of $2,000, which is to be increased later. The company has been promoted by Chas. A. Parsons and others, of Cleveland, and the expectation is to erect a steel casting plant having a capacity for castings ranging from 1 pound to 15 tons. Sites in Cleveland and at other Northern Ohio points have been under consideration. The following Cleveland men are named as incorporators: Michael Baalkis, Martyn Bonnell, Thos. E. Young, A. T. De Forest, Geo. K. Hosford, Robt. H. Carlisle, James A. Smith, H. P. Eells, W. W. Hayward, Chas. A. Patterson, F. G. Tallman, F. C. Phillips, J. W. Heiser, W. A. Reade, Carl C. Harris, A. O. Cunningham, G. H. Gardner, H. R. R. Jones, T. H. Bushnell, and Chas. A. Parsons.

Fires and Accidents:—

The plant of the Hagen Iron & Steel Co., Madison, Ill., was destroyed by fire April 29. Loss, $200,000; insurance, $100,000.

The main portion of the plant of the Bettendorf Steel Axle

Co., Davenport, Ia., was destroyed by fire on April 30; loss, $200,000.

The foundry of the Iron City Mfg. Co., Pueblo, Col., was destroyed by fire last week with a loss of $50,000.

The foundry of the Crowell Clutch & Pulley Co., Westfield, N. Y., was damaged by fire last week to the extent of $25,000.

New Construction:—

The Titusville Iron Co., Titusville, Pa., will build an addition 211x400 feet. It is to be completed by Oct. 1, when the force of employes is to be doubled. The present capitalization of the company is $250,000, but it is probable that this will be largely increased.

The Chicago, Milwaukee & St. Paul Railroad has voted an appropriation of $800,000 for extending the shops at West Milwaukee, Wis. The machine shop will be materially increased in size and a large portion of this appropriation will be expended in the purchase of machine tools.

The Jones foundry at Binghamton, N. Y., will be increased in capacity by the erection of an addition 60x45 feet.

The Youngstown Foundry & Machine Co., Youngstown, O., has purchased additional land adjoining its plant for an extension that will be erected shortly.

The Duncan Foundry, Alton, Ill., is erecting a 40-foot addition to its plant.

The small tool department of the Pratt & Whitney plant of the Niles-Bement-Pond Co., Hartford, Conn., will be increased by the erection of an addition that will cover 40,000 square feet.

The Columbus Chain Co., Columbus, O., is erecting two large buildings, giving additional floor space of 30,000 square feet. Additional tracks are being built also, so that 25 cars can be accommodated.

The Creswell & Waters Co., Philadelphia, Pa., will erect a foundry in connection with its plant 288x118 feet.

The Canton Bridge Co., Canton, O., is erecting a large addition to its plant that will increase the capacity fully 50 per cent.

The Alamo Engine Co., Hillsdale, Mich., is contemplating the erection of a foundry. A site has already been secured.

The Beall Shovel Co., Alton, Ill., will erect an addition to its plant 60x160 feet.

The Voss Mfg. Co., Chicago, Ill., will rebuild its plant, recently destroyed by fire. The new building will be 125x150 feet and two stories high.

The Lackawanna Railroad will erect a new machine shop at Elmira, N. Y., in the near future.

The American Bed Co., St. Louis, Mo., will erect a foundry 110x130 feet and an assembling building 125x210 feet.

The Norton Grinding Co., of Worcester, Mass., has broken ground for the new plant which is to be located near the works of the Norton Emery Wheel Co. The new building will be about 80x150 feet and two stories high. The main room will extend to the turret roof and a balcony will be located at the second story for the lighter equipment. It is the intention to have the new shop fitted with all modern conveniences, including an electric traveling crane. Power will be supplied by an electric connection with the plant of the Norton Emery Wheel Co. A spur track has been put in to give the necessary loading facilities and it is hoped that before many months the firm will be in a position to meet the increasing demands for grinders, which are now being made in two sizes, weighing about 11,000 and 8,000 pounds respectively. The company is also prepared to make a gap grinding machine for locomotive piston rods, grinding the rods with the heads in place.

The Builders' Iron Foundry, Providence, R. I., has obtained an extension of its option on the shore land of H. F. Gibson, at Bristol Highlands, R. I., until June 1. The industry is to move for the purpose of securing more foundry space and better transportation facilities.

New heating furnaces are being added to the plant of the Continental Iron Co., at Wheatland, Pa., and a number of other improvements are under consideration.

The Hyatt Roller Bearing Co., of Harrison, N. J., is having plans prepared for a modern shop to be erected on the property adjoining its present plant. The building will be 50x200, two stories high. The company for the last six months has occupied the buildings formerly operated by the Namreh & Siloh Match Co. and the Bowers Mfg. Co. Samuel M. Green, of Holyoke, is the architect. The above shop is a part of the improvements which are contemplated in order to take care of an increasing trade at home and abroad.

No additions are contemplated at present for the Falcon Works of the American Sheet Steel Co., at Niles, O. The recent report, that two sheet mills were to be added to the plant there, is incorrect.

The Deming Co., of Salem, O., has completed the foundry addition and is now installing new equipment in the machine shop.

A basic open-hearth steel furnace has been added to the new plant of the McConway & Torley Co., of Pittsburg.

A foundry is being added to the plant of the Minster Machine Co., of Minster, O., which will be equipped with pulley molding machines and other modern machinery.

The Courey Mining Co. has decided to erect a large machine shop at Ruby, near Helena, Mont.

The Rollins Engine Co., of Nashua, N. H., is clearing ground for a new building.

The Polson Iron Works Co., of Toronto, Can., will erect a two-story pattern shop at a cost of $3,500.

The Canadian Pacific Railroad Co. is to expend $75,000 on a roundhouse and machine shop at Fort William, Ont.

Kenton, O., will probably issue $50,000 bonds for the rebuilding of the works of the Champion Iron Co., which were burned last week.

Chain Belt Co., Milwaukee, Wis., has had plans prepared for a new building to be erected on Park St.

The Southern Illinois Foundry & Machine Co., Murphysboro, Ill., is having plans prepared for a new plant. The company was recently organized by W. H. Michael and others.

Lynchburg Plow Co., Lynchburg, Va., is contemplating enlarging its business to include the manufacture of mine cars and mine castings.

The National Iron Co., Duluth, Minn., contemplates erecting a two-story foundry building, 400x250, with pattern rooms and machine shop attached.

Joseph F. Rothe, Green Bay, Wis., will build a foundry and machine shop.

The Pierce, Butler & Pierce Mfg. Co., of Syracuse, N. Y., is making extensive additions to its plant, which is one of the largest in the country manufacturing radiators and hot water heaters.

The Pittsburg District:—

The Penn Bridge Co., of Pittsburg, is being promoted by the Real Estate Trust Co., which will take over the Penn Bridge Works at Beaver Falls, Pa., and will also erect a second bridge plant at Monaca, Pa. The Penn Bridge Co. will be taken over for a consideration of $180,000. The plant at Beaver Falls has a monthly output of about 600 tons. The new company will be capitalized at $450,000, and about $200,000 will be expended in the erection of the new plant.

E. E. Erikson, mechanical engineer, Pittsburg, has been awarded the contract for the erection of two acid open-hearth furnaces for the Chrome Steel Co., of New York. The company has been making five-ply welded chrome steel and iron plates at Brooklyn, N. Y., but the plant is to be removed to Carteret, N. J. The contract with Engineer Erikson also calls for three plate heating regenerative furnaces with gas producers. Other contracts recently closed by Mr. Erikson call for two regenerative heating furnaces for the Burden Iron Co., Troy, N. Y., and two continuous billet heating furnaces for Henry Disston & Sons, New York.

James McKay & Co., chain manufacturers, Pittsburg, will add 25 forge fires to the McKees Rocks, Pa., plant. The company now operates 75 fires.

The Pressed Steel Car Co., Pittsburg, last week filed a bill in equity in the Pittsburg courts against John M. Hansen, president of the new Standard Steel Car Co. A preliminary injunction is asked for requiring Mr. Hansen to deliver up certain blue prints, die drawings, and materials, 1,100 of which are specified and which are alleged to have a value of more than $1,000,000.

Options on land adjoining the plants of the National Tube Co., at McKeesport, Pa., have been given up, for the reason that the values placed thereon are considered too high by the

National Tube Co. officials for proposed extensions. No additions will therefore be made to the McKeesport plants, although extensive improvements were contemplated. The entire expenditure in improvements will now be used in the erection of the new plants, probably at Lorain, O., and Neville Island.

F. R. Phillips & Sons Co. has removed its Pittsburg office from the Schmidt Building to 721 Park Building.

William Swindell & Bros., engineers and contractors, deny that they have incorporated the American Furnace & Machine Co. with a capitalization of $100,000, which was recently incorporated in New Jersey and which was reported to have taken over the business of this successful concern.

M. Lanz & Sons, Carson St., Pittsburg, will erect an addition to their plant 20x80 feet. It will be used as a warehouse while the present warehouse will be used for an extension to the plant. The company manufactures bolts, nuts, washers, spikes, rivets and hinges.

The American Foundry & Construction Co., recently incorporated has perfected an organization by the election of the following officers: J. Miller, president; H. E. Weiskopf, secretary and treasurer; G. E. Klingelhofer, general manager. The company has secured a site of 1½ acres at Hazelwood and will erect a two-story machine shop 80x160 feet and a foundry 85x160 feet. The company will make a specialty of piping for blast furnace and rolling mill work. Offices have been opened in the Frick Building.

Heyl & Patterson, Pittsburg, has received a contract from the Republic Iron & Steel Co. for a slab conveyor to be installed in the Bessemer plant at Youngstown, O.

The S. Severance Mfg. Co., of McKeesport, has been organized with a capitalization of $50,000. The new company will take over the old Severance plant at Glassport.

The St. Clair Steel Co., of Pittsburg, one of the subsidiary companies of the Crucible Steel Co., of America, has decided to add a Bessemer converting plant to contain two 10-ton vessels. Twelve open-hearth furnaces are under erection at this plant and four will probably be placed in operation in July. When completed the plant will have an output of about 1,000 tons of open-hearth and 1,500 tons of Bessemer steel.

The Westinghouse Electric & Mfg. Co. has made an agreement with the Lorain Steel Co., of Lorain, O., whereby the former acquires the electric railway equipment business of the latter. The plant of the company is located at Johnstown, Pa., and will no doubt be continued in operation by the Westinghouse company. The British Westinghouse Co. has been awarded the contract for equipping the Metropolitan Railway Co., of England, with steam turbines for its power station.

The Westinghouse Air Brake Co. will erect a new warehouse at Wilmerding 120 feet long and 60 feet wide.

The unusual demand for the White Star oil filter has forced the Pittsburg Gage & Supply Co., of Pittsburg, again to enlarge this department of its business by taking the entire third floor of its new works, 3101-3111 Liberty St., to be exclusively devoted to its manufacture. The greater part of the second floor will be devoted to holding a large stock of all sizes of the White Star oil filters, permitting prompt shipments to be made.

General Industrial Notes:—

The Norwood Bicycle Co., 2nd and Plum Sts., Cincinnati, which has been closed down on account of a fire which occurred on March 8, has resumed business. At present the company is giving attention to ball bearings but within a short time will also manufacture specialties.

The Allfree Engine Co., of Indianapolis, is starting a municipal lighting plant at Richmond, Ind.—one 300-k. w. alternator direct-connected cross-compound heavy duty engine, also one 450-k. w. alternator direct-connected to a cross-compound heavy duty engine. The exciting current for the generators is furnished by two 30-h. p. direct-connected automatic engines operating 20-k. w. General Electric Co.'s generators.

During April the open-hearth department of the Sharon Steel Co., Sharon, Pa., broke its record by producing 18,806 tons. There are eight furnaces in this department, but during this period several were shut down for brief periods. Each of the furnaces has a capacity of 50 tons.

Some new records were made in April at the South Works of the Illinois Steel Co. The tonnages, together with the best previous records at these mills, are as follows: Steel mill, 80,709 tons of ingots, against 80,480 tons; rail mill, 64,214 tons, against 64,178 tons; plate mill, 12,009 tons of sheared plates, against 11,702 tons; slabbing mill, 21,637 tons of billets, blooms and slabs, against 21,428 tons.

Press despatches from Columbus, O., intimate that the recently incorporated John R. Morgan Engineering Co. of that city has disbanded. The high price of structural steel and the inevitable delay in procuring new machinery are given as the causes of the temporary abandonment of the enterprise.

The plant of the Hartman Mfg. Co., at New Castle, Pa., is to be sold under the hammer this week to satisfy the debts, after an attempt of the creditors to have President Henry, of the Cuyahoga Iron & Steel Co., take charge of the concern.

It is reported that the Western Wheeled Scraper Co., Aurora, Ill., has purchased the business and good will of the F. C. Austin Mfg. Co., Harvey, Ill., the Fleming Mfg. Co., Fort Wayne, Ind., and the Indiana Road Machine Co., also of Fort Wayne. The price paid for the Austin Mfg. Co.'s plant is reported to be $500,000. It is stated also that negotiations have been opened with the American Road Machine Co., Kennett Square, Pa., with the object of uniting that concern with the consolidation. Nothing has yet been given out regarding the capital stock or the name of the new company.

The Inland Steel Co., Marquette Building, Chicago, announces that the recent cash increase in the capital stock of the company from $1,500,000 to $2,000,000, was made to provide funds for extending the scope of the company's operations at its new works at Indiana Harbor, Ind., which it is expected will be in operation early in June. The company will manufacture at this plant open-hearth billets, slabs, sheet and tin plate bars, shafting, plain and galvanized sheets, and arrangements are being made to roll the lighter sections of structural angles, channels and I-beams. It will have a capacity of 500 tons a day.

The new wire plant of the Kokomo Steel & Wire Co., Kokomo, Ind., will be in operation in the next two weeks. It is regarded as one of the most modern in the country. The output will be 350 to 400 tons a day. The rod mill and power house are of steel, the remaining buildings being of brick. The company will manufacture a full line of farm and field fencing and will also manufacture a special barb wire.

An iron ore property that has been partly developed near Waukon, Ia., in the past year is the basis of a proposition made by Waukon interests to build a blast furnace at Dubuque, Ia. Dubuque is asked to furnish a site. Limestone is found near Dubuque. W. J. Ingram and L. W. Beard, who are interested in the Waukon iron mine, are the promoters of the project.

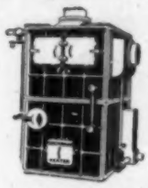
The Uehling-Steinbart Mfg. Co. announces the removal of its Carlstadt and New Brunswick, N. J., plants on May 1 to Passaic, N. J.

The Fox Machine Co., of Grand Rapids, Mich., has reorganized its typewriter business under the name of the Fox Typewriter Co., Ltd. The capital is $1,000,000, divided into $400,000 preferred and $600,000 common stock. The directors are: William R. Fox, Clay H. Hollister, James R. Wylie, Fred Macey and George Clapperton. The manufacture and sale of special tools and machinery will be continued by the Fox Machine Co. The manufacture and sale of the Fox typewriter will be rapidly enlarged and extended.

The Wabash Bridge Co., Wabash, Ind., has been awarded the contract for the erection of the bridges between Cottage Grove and Cincinnati, O., on the new extension of the Cincinnati, Richmond & Muncie Railroad. There will be at least half a dozen steel structures ranging in length from 400 to 680 feet. About 5,000 tons of structural material will be required in their erection.

The Plymouth Rolling Mills, E. Stanford, lessee, of Conshohocken, Pa., have resumed operations after an extended idleness. David Charles, of Norristown, Pa., has been placed in charge of the puddling department. The product is muck bar, black plates for tinning and sheets.

The Buffalo Steel Co., of Tonawanda, N. Y., is now rolling light sections of T-rails—8, 12, 16 and 20 pounds per yard.



I WILL BUY A COCHRANE HEATER

There are quite a few men, who, not having bought Cochrane Heaters, have explained that it was "Simply a matter of price." Don't you think that is a very poor excuse for buying anything else? Did those purchasers reflect that with that other maker of heater it was also "simply a matter of price?" And that in the design, arrangement, selection of material and fittings, etc. the manufacturer who was catering to those who were affected by a matter of price was constantly influenced and governed by the fact that he was depending on "simply a matter of price" to effect the sale?

Now with us it is not the same. We have too much at stake to build heaters on any such basis. We want people to have heaters that shall give them all that can be gotten out of exhaust steam for heating and purifying water—heaters that shall last long, and be free from repairs—heaters that shall be reliable in operation and easy to clean and to operate.

So in building the "COCHRANES" we use the best for the purpose—make them of generous proportions—equip them with a really efficient oil separator—use plenty of good metal, and put it in the right place—attach to them first class fittings, water gauges, floats, regulating valves, etc.—and then we stand by those COCHRANE HEATERS from first to last, and all the time, knowing that they represent good workmanship and good material. It is not "simply a matter of price" with us, but very full value given for value received.

Write for Catalogue "H-S"

HARRISON SAFETY BOILER WORKS, Clearfield and 17th Sts., PHILADELPHIA, PA.

A MATTER OF CHOICE

LOTS OF FUEL, LITTLE STEAM, MUCH WASTE, DIRTY BOILERS — OR — LITTLE FUEL, LOTS OF STEAM, NO WASTE AND CLEAN BOILERS

ITS UP TO YOU. THE LATTER IS ATTAINED BY THE USE OF STILWELL'S FEED WATER HEATER.

WRITE FOR INFORMATION

THE STILWELL-BIERCE & SMITH-VAILE CO.

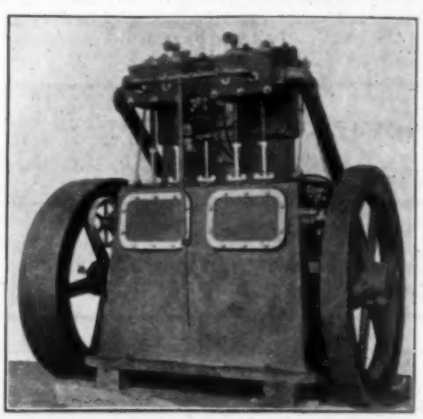
M.O.B. 227, DAYTON, OHIO.

TIN PLATES

Coke Charcoal Roofing

Galvanized and Black Sheets

The J M & L A OSBORN CO. CLEVELAND COLUMBUS



Maywood Gas and Gasoline Engines.

Sizes 10 to 60 H. P. Vertical Multiple Cylinder Type-Throttling Governor. Highest Grade. Especially adapted for Electric Lighting and high grade power purposes. **25 and 50 H. P. Engines in Stock for Immediate Shipment.** Write for further information.

Maywood Foundry and Machine Co.,

Chamber of Commerce Bldg., Chicago, Ill.

If a Machine Costs $1000

And does $5,000 worth of work, it is cheaper than a machine that costs $10 and only does $5 worth of work—

Carborundum

grinding wheels cost more than other abrasive materials—but they do so much more work, so much better work and last so much longer that they are by far the cheapest in the end.

Write for the Carborundum book telling all about modern abrasives.

The
Carborundum Company
Niagara Falls, N. Y

CLEVELAND RIVET & FORGING CO.
MANUFACTURERS OF
EAGLE RAILROAD FORGINGS. RIVETS BRAND SPECIAL FORGINGS
CLEVELAND, OHIO.

PERFORATED PLATE SCREENS
AS REQUIRED FOR
Stone, Ore, Zinc, Lead, and all Railroad and Mining Uses.
SPECIAL SCREENS FOR COAL AND COKE.
HENDRICK MFG. CO.,
Samples and information upon request. Carbondale, Pa.

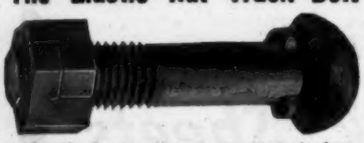
Allis-Chalmers Co.,
CHICAGO.

Perforated Plates

for Incline Shaking and Revolving Screens for Coal Washing and Cleaning, and all other purposes.

Write for Prices.

The Elastic Nut Track-Bolt



makesthe best and cheapest rail-fastening. NUTS NEVER WORK LOOSE. Requires no nut-lock. Our Elastic Self-Locking Steel Nut always stays, and is superior for use on Cars, Track, Bridges, Machinery etc. Write us for prices on Sq. and Hex. Nuts, (Elastic or Common) Machine Bolts, Track Bolts, Rivets, etc.

NATIONAL ELASTIC NUT CO.,
MILWAUKEE, WIS.

The "ORIGINAL CANDY"
STITCHED COTTON DUCK BELTING.

Especially adapted for Main Drivers, Saw Mills, Cotton Gins, Cotton Presses, and for all places where belts are subjected to moisture or atmospheric changes, the "CANDY" stands paramount.
For further information, prices, etc., write

THE CANDY BELTING CO., Baltimore, Md.

BOOKS.

A great many of our subscribers are buyers of technical books of various kinds. It is a good habit to have. We can furnish any of the books at publisher's prices and will be glad to assist you in making your selections.

THE IRON TRADE REVIEW,
Cleveland, O.

KEEP'S "CAST IRON."

Mr. Keep is well known to the readers of *The Iron Trade Review*. His writings on the subject of regulating mixtures of cast iron through the medium of mechanical analysis, otherwise known as *Keep's Test*, have been of unusual interest.

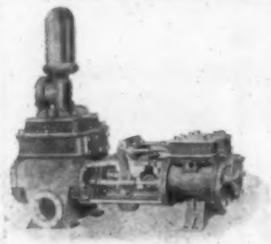
In his new book, "*Cast Iron*," Mr. Keep relates his experiments and researches in the field of cast iron. It is a work which every foundryman who desires to produce the best grade of castings at the least cost should have at his command. Two dollars and a half secures it.

The Iron Trade Review, 1064 Rose Building, CLEVELAND, O., U. S. A.

Why don't you subscribe for
THE IRON TRADE REVIEW
and keep posted.

PHOENIX HORSE SHOES Are the Best Shoes Made.
CATALOGUE SENT ON REQUEST.
PHOENIX HORSE SHOE CO., POUGHKEEPSIE, N. Y.—JOLIET, ILL.

The Blakeslee Jet Pump



is always ready to do your pumping as long as you have steam at your command. It will pump sandy and impure water which other pumps cannot handle. There being no valves on the **Blakeslee Jet Pump,** there is nothing to wear out nor anything to get out of order. Covpled with reliability under all condition the **Blakeslee** shows exceptional economy.

Ask us to mail you further particulars.

BLAKESLEE MFG. CO., Du Quoin, Ill.

RUBEROID

HIGHEST AWARD,
GOLD MEDAL
AT PAN-AMERICAN.

A Superior Factory Roofing.
THE STANDARD PAINT COMPANY,
100 William St., NEW YORK.
188-190 Madison St., CHICAGO.

Who Builds the best Mine Pump?

Prescott.

Fred. M. Prescott Steam Pump Co., Milwaukee, Wis.

Forgings

FOR ALL POSSIBLE PURPOSES made as they should be.

CRAWSHAW & JUDD,
51 Union St., WORCESTER, MASS.

PROTECT

From Rust, Fire, Sun, Water and Weather by using our products. . .

Pure Red Lead

Kept from settling by our **Double Oxygenized, Pure Linseed Oil.**

The National Fireproof Paint Co.
40 Dearborn St., Chicago, Ill.

DEPARTMENT "B"

"We will appreciate your inquiries."

McLANAHAN-STONE MACHINE CO., (Caysport Foundry) Hollidaysburg, Pa.

ENTIRE OUFITS for WASHING and DRESSING ORES and PHOSPHATES at Least Cost.

Improved Washers with steel or wood logs. Screens, cylindrical and conical of all descriptions. Steel, slow moving elevators and conveyors. Picking Belts for coarse material and hard usage. Friction Hoists. Single Roll Crushers for rough crushing in large quantities.

CASTINGS of every DESCRIPTION. ESPECIALLY HEAVY ONES.

Imhauser's Watchman's Time Detectors
That cannot Fail.

Highest Award Pan-American Exposition

Made with 12 or 24 different Keys. Contain all the modern improvements. Warranted in every way. Cannot be tampered with, without detection.

Manufactured by **E. IMHAUSER & CO.,**
Write for catalogue. 206 Broadway, N. Y.

FORGINGS.

PIG IRON, COAL, COKE,

PILLING & CRANE.

PHILADELPHIA: Girard Building. PITTSBURG: Lewis Building. NEW YORK: Empire Bldg.

THE CHICAGO SCREW CO.

SET, CAP and MACHINE
Hexagon Nuts, Studs, Etc. **SCREWS.** Coupling Bolts Specials.
No. 2 N. Canal St., - - CHICAGO.

If you want an automatic stoker that is entirely automatic.
If you want to save labor and cost of firing.
If you want to be able to burn a cheap coal instead of a high grade.
If you want smokeless combustion.
Then you want the

Green Traveling Link Chain Grate.

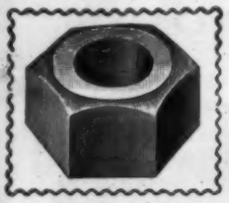
Write to the **Green Engineering Co.,**
Western Union Bldg.,
Get our complete catalogue CHICAGO, ILL.

- - USE - -
- DIXON'S -
CRUCIBLES.

Joseph Dixon Crucible Co.
Jersey City, N. J.

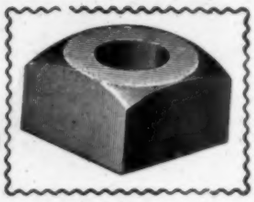
THE MILTON MANUFACTURING CO.,

Milton, Pa.



MANUFACTURERS OF

COLD PUNCHED NUTS

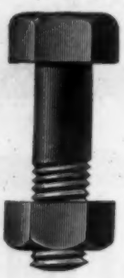


Hot Pressed Nuts, Plate Washers, etc.

Quality and Finish the Best. **Send Specifications for Prices.**

American Iron & Steel Mfg. Co.

General Offices at Lebanon, Pa., U. S. A.



MANUFACTURERS OF

MERCHANT BAR IRON AND STEEL

(Annual Capacity about 150,000 Tons)

Also Every Variety of

Machine Bolts, Nuts, Washers, Turnbuckles, Lag Screws

Railway and Dock Spikes, Harbey Grip and other Railway Track Bolts

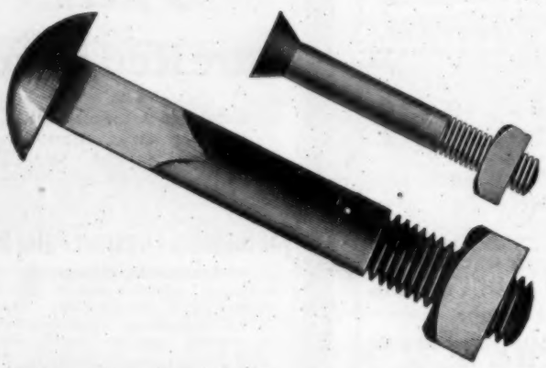
Boiler, Ship and Structural Rivets

CAR FORGINGS and RODS AND IRONS FOR BRIDGES, BUILDINGS, ETC., ETC.

This Company owns and operates the works formerly owned by

J. H. STERNBERGH & SON, Reading, Pa. NATIONAL BOLT, NUT AND RIVET WORKS, Reading, Pa. LEBANON IRON CO., Lebanon, Pa

EAST LEBANON IRON CO., Lebanon, Pa. PENNSYLVANIA BOLT AND NUT CO., Lebanon, Pa.



The Highest Grade

of fit and finish is attained in our Philadelphia Eagle Carriage and Tire Bolts.

THE UPSON NUT CO.,

CLEVELAND, OHIO.

REPUBLIC IRON & STEEL CO., CHICAGO, ILL.

BAR IRON BAR STEEL

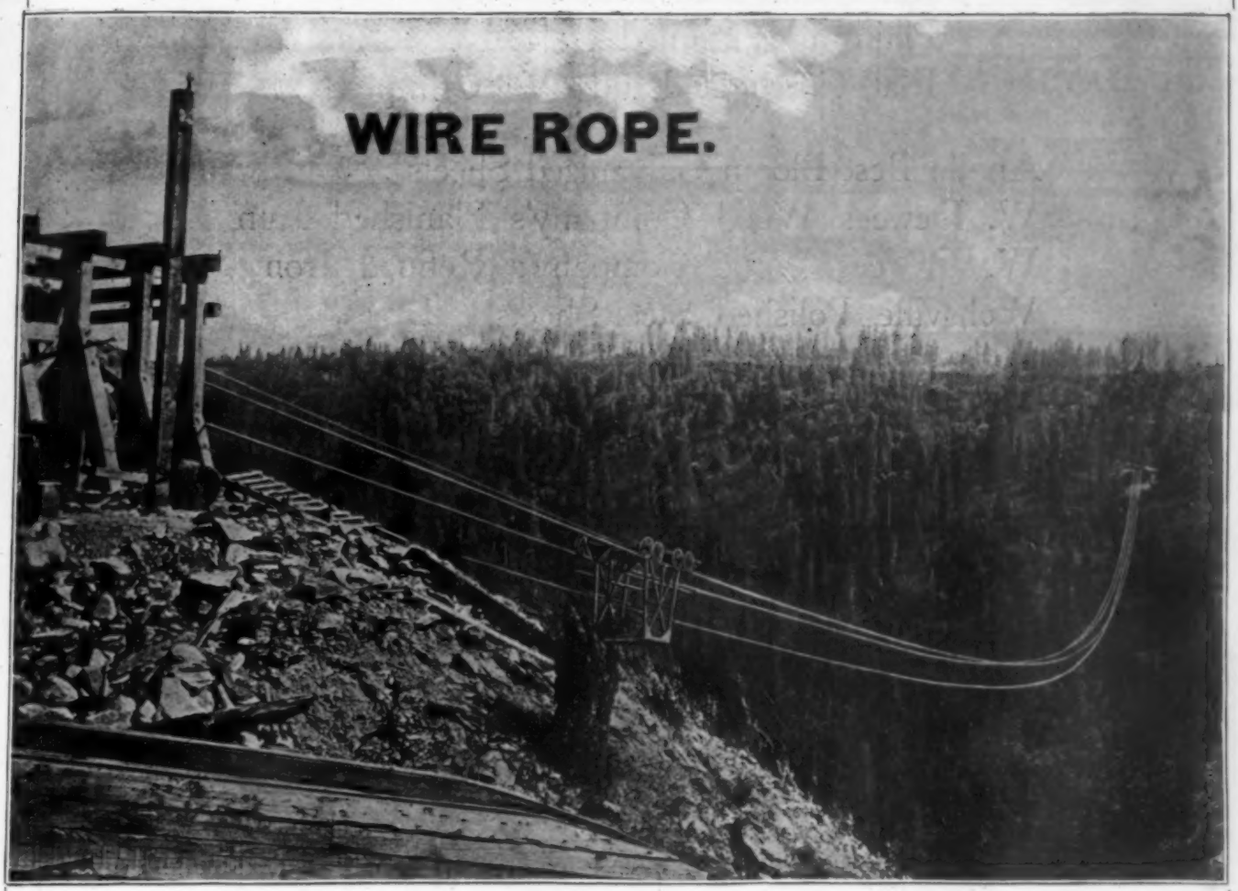
MACHINE BOLTS, CARRIAGE BOLTS, GIMLET POINT COACH SCREWS, TURNBUCKLES.

NUTS. **R. R. SPIKES.** **PIG IRON.**

NEW YORK, CLEVELAND, BIRMINGHAM, BUFFALO, CINCINNATI, ST. PAUL, SAN FRANCISCO, ST. LOUIS, BUTTE, MONT.

American Steel & Wire Co.

CHICAGO, The Rookery. NEW YORK, Empire Bldg. WORCESTER, MASS. DENVER, 809 17th St. SAN FRANCISCO, 8 and 10 Pine St.



WIRE OF EVERY DESCRIPTION, round, flat, square, triangular and odd-shaped. Barbed Wire. Music Wire. Bale Ties. Wire Rods. Wire Hoops. Mattress, Broom, Weaving and Market Wires. Special Wires adapted to all purposes.

NAILS, STAPLES, SPIKES and TACKS. Standard Wire Nails in all sizes and shapes. Miscellaneous Fine Nails. Tacks in count and weight packages. Dowel Pins.

ELECTRICAL WIRES and CABLES, bare and insulated. Telegraph and Telephone Wires.

RAIL BONDS for Electric Roads.

SPRINGS, Clock, Motor, Car, Furniture, Agricultural and all kinds of Fine and Heavy Springs.

COPPERAS and VENETIAN RED.

POULTRY NETTING, galvanized before weaving. All meshes and sizes.

HORSE SHOES, "Juniata" brand, iron or steel, in all sizes and patterns. Toe Calks.

COLD DRAWN STEEL, SHAFTING, Free Cutting Screw Steel. Roller Bearing Rods, Rounds, Squares, Hexagons, Flats and Special Shapes.

PLATES AND SHEETS of Bessemer and Open Hearth Steel.

SEE OUR EXHIBIT AT THE CHARLESTON EXPOSITION.

American Sheet Steel Company

Battery Park Building New York

Manufacturers of all varieties of

IRON AND STEEL SHEETS

Black and Galvanized
Plain and Painted
Flat, Corrugated and "V" Crimped

Apollo Best Bloom Galvanized Sheets
W. Dewees Wood Company's Planished Iron
W. Dewees Wood Company's Refined Iron
Wellsville Polished Steel Sheets

DISTRICT SALES AGENTS

W. J. Wetstein & John W. Good, Security Building, St. Louis
S. J. Waterman, Union Trust Bldg., Cincinnati
Hodge & Swift, Portland, Oregon
F. A. Goodrich & Company, Chamber of Commerce, Detroit
Wm. B. Isaacs, 226 Market Street, San Francisco
B. & S. H. Thompson & Company, Montreal, Canada
T. W. Simpers, Land Title Building, Philadelphia
F. C. Milliken, Vandergrift Building, Pittsburg
S. L. Mitchel, Hennen Building, New Orleans
W. T. Shannon, 34 West Ninth Street, Chattanooga
Lee Chamberlain, Los Angeles
L. A. Hastings, 1622 Arapahoe Street, Denver

DISTRICT SALES OFFICE: MARQUETTE BUILDING, CHICAGO

H. H. DICKEY, Pres. *A. F. BAUMGARTEN, V. Pres.* *H. E. WEBER, Sec'y & Treas.*

SHEETS OPEN HEARTH-BLUE ANNEALED,

GAUGES 10 TO 22, WIDTHS UP TO 48″.

BLACK PLATES, HARROW DISCS, BILLETS.

FORGINGS, OPEN-HEARTH STEEL CASTINGS, BARS.

MARYLAND SHEET & STEEL CO., Cumberland, Md.

WAUKESHA SHEET STEEL COMPANY, WAUKESHA, WIS.

Manufacturers of BLACK and GALVANIZED SHEETS, PLAIN and PAINTED, FLAT and CORRUGATED.

Works and General Office, WAUKESHA, WIS.

WHY? Are **ALUMINUM COATED STEEL SHEETS** replacing Galvanized for all purposes.

Because they are superior in every respect. Can be heated to red heat without destroying the coating. Can be soldered with common solder. Sulphurous gases, brines and acids will not touch the coating as readily as galvanized.

STEEL & IRON ALUMINUM COATING CO., Connellsville, Pa.

STEEL CASTINGS That will Forge, Weld and Temper. Will not Crystallize.

Graphite through the metal breaks up vibration.

GRAPHITE METAL CO.,
17 Cortlandt St.,
NEW YORK, U. S. A.

This—(MF)—is the trade-mark stamped on every sheet of M F Roofing Tin—the best roofing tin made—fifty years the world's standard for roofing tin. This mark is evidence that the tin bearing it has the heaviest and richest coating of pure tin and new lead, dipped by the palm-oil process, and manufactured entirely by hand *labor, M F is impervious to rust—it is the roofing that will last a lifetime, and costs but little more than a roof that burns—or melts—or freezes—or breaks. If you are going to rebuild, specify M F ROOFING*

MF

Ask your roofer for MF Roofing Tin—
Or write to **W. C. CRONEMEYER, Agent, Carnegie Building, Pittsburg** for illustrated book on roofing. Mailed free to any address.
AMERICAN TIN PLATE COMPANY, New York.

Men Who Think

About the fitness of things must recognize the value of attracting the attention of proprietors, managers and superintendents of machine shops. They well know that these same men know a great deal more about what tools and equipment they should buy than they used to know. They don't trust to foreman and machinists to recommend tools to them as they once did. If you will watch THE IRON TRADE REVIEW you will understand that it reaches the *managerial* and *buying* side, or, in other words, proprietors and managers and superintendents.

THE IRON TRADE REVIEW,

Cleveland. *Chicago.* *Pittsburg.* *New York.*

A RECORD WHICH STANDS ALONE!

ONE HUNDRED AND FIFTY TONS OF WIRE in a 22-hour run with only thirty-six Blocks.

THE SUPERFICIAL OBSERVER thinks our prices for Wire Benches are very high. He sees a bench, blocks and shaft, and realizes the fact they turn around just the same as the bench of twenty-five years ago did. He realizes that they are a little heavy, but don't see very much difference.

THE MANUFACTURER WHO GOES INTO THE MATTER FULLY realizes the fact that our benches are carefully designed, our gearing all open-hearth steel, that all parts are heavy, with the result that our regular one-hundred-ton outfits have only thirty-six blocks, where the other manufacturers of wire machinery reckon sixty.

THE RESULT IS SIMPLY THIS: By installing an equipment of our machinery, the money you will save in wire-drawers' wages will pay for our plant complete in less than two years' time.

UP-TO-DATE MANUFACTURERS realize this and are equipping their mills with our machinery, paying the extra price. You had better look into this matter—it may save you dollars. Shall be pleased to hear from you.

THE TURNER, VAUGHN & TAYLOR CO., Cuyahoga Falls, O.

THE CUYAHOGA STEEL & WIRE COMPANY,

Office and Works: CUYAHOGA FALLS, O.

MANUFACTURERS OF

WIRE RODS.

Annealed and Galvanized Fence Wire.
Bright, Tinned and Coppered Market Wire.
Tinned Mattress and Broom Wire.
Annealed Stone Wire.

Wire Straightened and Cut to Lengths.

WIRE NAILS.

THE

LORAIN STEEL COMPANY,

Lorain, Ohio.

Rails, Blooms, Billets and Slabs.

American Steel Hoop Company

GENERAL SALES OFFICES: CARNEGIE BUILDING, PITTSBURGH, PA.

DISTRICT SALES OFFICES:

ATLANTA: Equitable Building BOSTON: Telephone Building BUFFALO: German Insurance Building
CHICAGO: The Rookery CINCINNATI: Union Trust Building CLEVELAND: Perry-Payne Building
DENVER: People's Bank Building DETROIT: Union Trust Building NEW YORK: Empire Building
PHILADELPHIA: Harrison Building SAN FRANCISCO: 258 Market Street
ST. LOUIS: Chemical Building ST. PAUL: Pioneer Press Building WASHINGTON: National Safe Deposit Building

FOREIGN SALES OFFICES:

LONDON, ENG.: 71 and 72 King William Street MONTREAL, CANADA: Bell Telephone Building
CITY OF MEXICO, 924 Apartado.

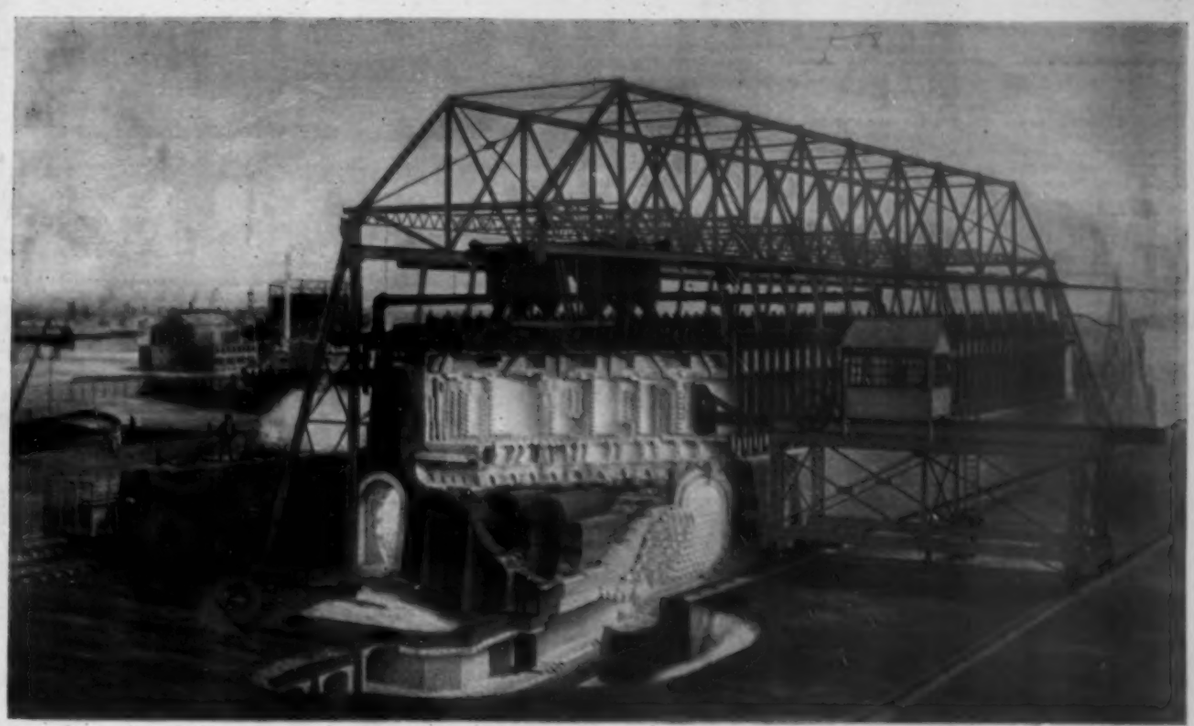
GENERAL LIBRARY,
UNIV. OF MICH.
MAY 15 1902

THE IRON TRADE REVIEW

A Weekly Journal Devoted to the Machinery, Metal-Working and Foundry Trades, and Iron and Steel Manufacture.

VOLUME XXXV. CLEVELAND, O., MAY 15, 1902. NUMBER 20

THE UNITED COKE & GAS COMPANY, 277 BROADWAY, New York.



REPRODUCTION OF OTTO-HOFFMAN BY-PRODUCT COKE OVEN PLANT, CAMDEN, N. J

ENGINEERS AND CONTRACTORS
for the complete erection of Coke Oven Plants, with or without the saving of By-products. Write for information.

Blast Furnaces, Steel Works, Rolling Mills.
The Wm. B. Pollock Company,
YOUNGSTOWN, OHIO.
Steel Plate Construction.
Self Supporting Chimneys, Riveted Pipe, Converters, Ladles, Etc.

Steel and Malleable Castings.
TRUE TO PATTERN.
QUALITY UNSURPASSED.
STEEL WILL HARDEN LIKE TOOL STEEL.
Acme Steel & Malleable Iron Works,
BUFFALO, N. Y.

REED F. BLAIR & CO.,
Lewis Bldg., PITTSBURG, PA.
Coke. Pig Iron. Chrome Ore.
FERRO-MANGANESE.
Silicon Spiegel, Etc.

F. A. EMMERTON,
Chemist, Assayer and Metallurgist.
Ores sampled at lake ports, mines and furnaces.
Mines and Metallurgical Processes Examined.
Analyses made of Ores, Metals, Fuels, Railroad and Foundry Supplies, etc.
9 Bratenahl Building, CLEVELAND, O.

Fire Brick, Fire Clay, Pig Iron.
F. B. STEVENS, Detroit, Mich.

THE ROBERT W. HUNT & CO.
Bureau of Inspection, Tests and Consultation.
PITTSBURG: Park Building. CHICAGO: 1137 The Rookery. NEW YORK: 71 Broadway.
Reports on iron and steel processes and plants. Inspection of steel rails, splice bars, railroad cars, wheels, axles, etc. Chemical Laboratory, Analysis of ores, iron, steel, oils, water, etc. Physical Laboratory—Test of metals, drop and pulling test of couplers, draw bars, etc. Efficiency tests of boilers, engines and locomotives.

THE METALLURGICAL LABORATORY,
ANALYTICAL CHEMISTS
CHEMICAL AND MINING ENGINEERS.
Analyses, Assays, Consultations — 545 Liberty Ave., PITTSBURG, PA. — Examine and Report on Properties.
Samples taken anywhere in U. S.

The American Mfg. Co.,
65 WALL ST., NEW YORK.
MANUFACTURERS OF
BEST TRANSMISSION ROPE AND
PIPE CORD.
WRITE FOR PRICES.

MEADVILLE MALLEABLE IRON CO.,
Meadville, Pa.
MALLEABLE CASTINGS of any description.
SATISFACTION GUARANTEED.

DROP FORGINGS.

Oil Burners, Forges and Crucible Furnaces for Crude Oil Equipment.
Railway Braces,
Railway Track Tools,
Forged Steel Picks,
Track Wrenches, Steam Hammer Forgings.
UNION DROP FORGE CO., 68-70 E. Ohio St., CHICAGO, ILL.

BOOKS A great many of our subscribers are buyers of technical books of various kinds. It is a good habit to have. We can furnish any of the books at publishers' prices and will be glad to assist you in making your selections.
THE IRON TRADE REVIEW, :: Cleveland, O.

AMERICAN AIR COMPRESSOR WORKS.
Air Compressors for all Purposes.
26 Cortlandt Street, NEW YORK.

AIR COMPRESSORS
For every application of Compressed Air Power.
Complete Catalogue E upon application.
Clayton Air Compressor Wks.
120 Liberty Street, NEW YORK.

ROCK DRILLS
FOR IRON ORE MINES. FOR HARD OR SOFT ROCK.
The Ingersoll-Sergeant Drill Co.,
Williamson Bldg., CLEVELAND. 26 Cortlandt St., N. Y.

"IMPERIAL"
AIR COMPRESSORS
FOR
MACHINE SHOP SERVICE.
Standard Sizes or Special Designs to Meet Any Conditions.
RAND DRILL COMPANY, 128 Broadway, NEW YORK.

FISHER AIR COMPRESSOR.
A. J. FISHER, 50 So. Clinton St., CHICAGO.
By attaching a Fisher Compressor tandem to your engine and utilizing surplus power, the best results will be obtained. I make Compressors any size to suit any engine. Automatically regulated and does not compress air unless it is being used.